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LETTERPRESS

CAPITALS AND OTHER ARCHITECTURAL DETAILS FROM ANCIENT ROMAN BUILDINGS. GIOVANNI BATTISTA PIRANESI, DEL.

THE BRICKBVILDER
VOL. 18 NO. 5 DEVOTED·TO·THE·INTERESTS·OF·ARCHITECTVRE·IN·MATERIALS·OF·CLAY· MAY 1909

Gymnasiums — Their Plan and Equipment — IV.

BY M. B. REACH.

IT WILL be observed in studying the plans and equipments of men's and women's gymnasiums that there is sufficient similarity between equipments to permit their adaptation to either with comparatively few changes in the nature of additions. In a co-educational institution where one gymnasium is planned to accommodate the two sexes the extra cost of equipment is in comparatively small ratio, and the general scheme of arrangement would remain very much the same. Separate entrances to the gymnasium from the locker rooms must be provided and the location of locker rooms should insure the proper degree of privacy. I like the scheme where the entrances to separate dressing rooms from the gymnasium are at each end of the gymnasium and by the offices of the director in charge. Hence, in an institution having a director for men and one for women, as is usually the case, their offices and examining rooms can be so located as to properly guard against any intrusion through the gymnasium and permit the inside work of each to be carried on at all times.

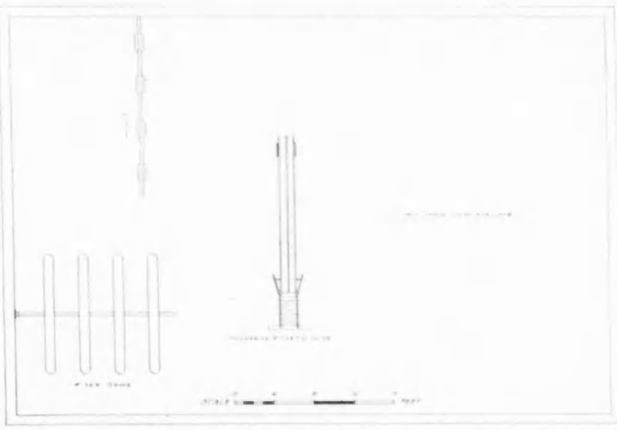


FIG. 18. PLAYROOM FOR CHILDREN.
Equipment: Four swings, four see-saws, one children's athletic slide, small game apparatus, bean bags, hoops, jump ropes, rubber balls, etc.

The merits of coalescing the working equipments must be judged by conditions. In some instances it is in every way practical, efficient, and economical. In others I think it a mistake. A church gymnasium, which usually is, and should be, in the adjoining parish house or guild hall, can be so operated with the best of results. Gymnasiums of this class are social and recreative; the work and hours may be regulated to satisfy all, and accomplish the purposes of the organization. The same rule would undoubtedly hold true in many normal schools and colleges. Very often there is a decidedly predominating majority of one sex which simplifies matters and seldom do we find the frightful amount of congestion and specific conditions that exist in other institutions where combined work is objectionable. It devolves into a problem of simple mathematics after all — amount of work to be done divided by the working hours. We all experience similar problems and when obvious that adjustment is necessary we add the machinery, men, or rooms and go ahead to get the result. Unfortunate it is at times, that our scheme of education is so lacking in practical methods.

Any modern public school has provisions made in its plan for a gymnasium. Gymnasium work is gradually being accepted by our educational bodies as necessary, and therefore desirable. In is a compulsory part of the curriculum. Our schools, particularly our city schools, are all crowded and under congested conditions of this kind. I hold that one gymnasium for girls and boys combined is inadequate and about as productive of results and progress as a motor car of 60 horse power size and design with a single horse-power engine.

The school hours are short and the attendance large. Class work for the individual two or three times a week is almost farcical. If there is any merit in this branch of work, any profit, mental, physical, or moral, why such half-hearted measures? Why not provide the maximum of efficiency and reap a paying result? We are undoubtedly making serious mistakes in designing school buildings that cannot possibly accommodate the children of the present in any satisfactory manner, and which are constantly growing more congested. Education through play is now sweeping the country broadcast. Schools having yards are equipping them with gymnastic and playground apparatus. Others bemoan the fact that they are destitute of opportunities to keep abreast. Schools in New York are utilizing their roofs.

These are the present conditions at the inception, almost, of this broad educational policy. What will be the conditions ten years hence when the movement commences to show its growth? So far as new buildings are concerned it depends entirely upon the enlightened archi-

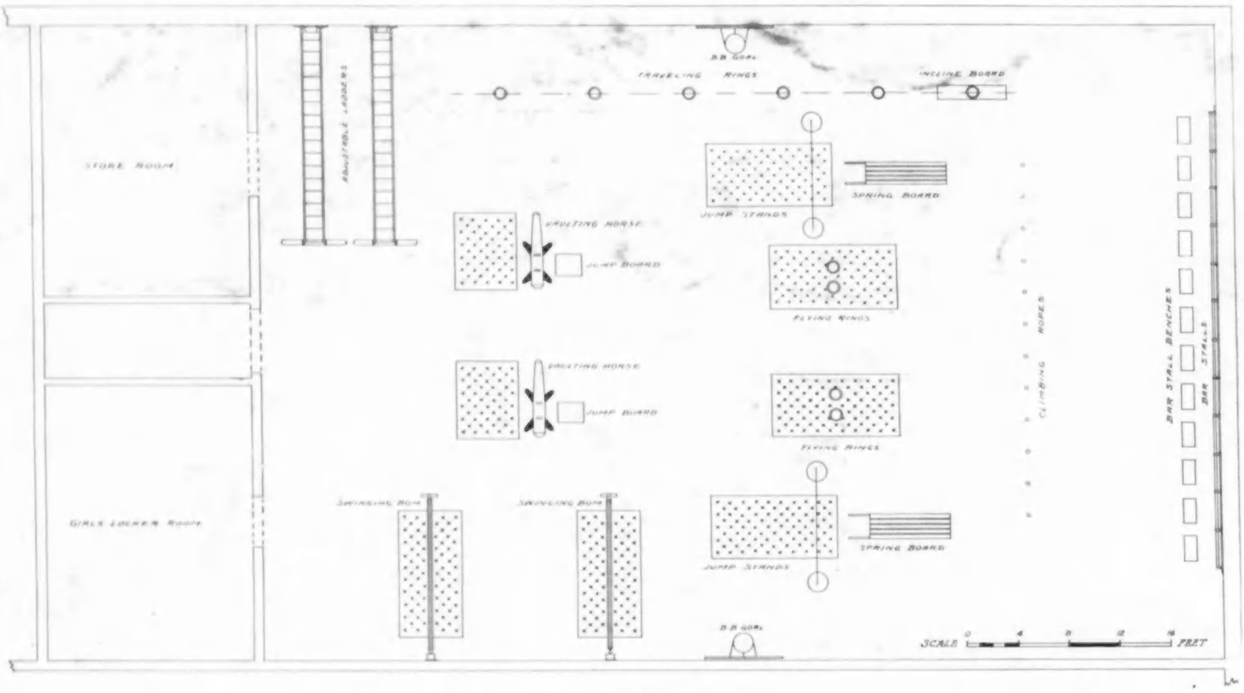


FIG. 19. A GIRLS' GYMNASIUM.

Equipment: Twelve sections bar stalls, twelve bar stall benches, twelve climbing ropes, two spring boards, two jump standards, two pairs flying rings, six traveling rings, one incline board, two swinging booms, two vaulting horses, two jump boards, two adjustable ladders, basket ball goals, mattresses, miscellaneous small apparatus.

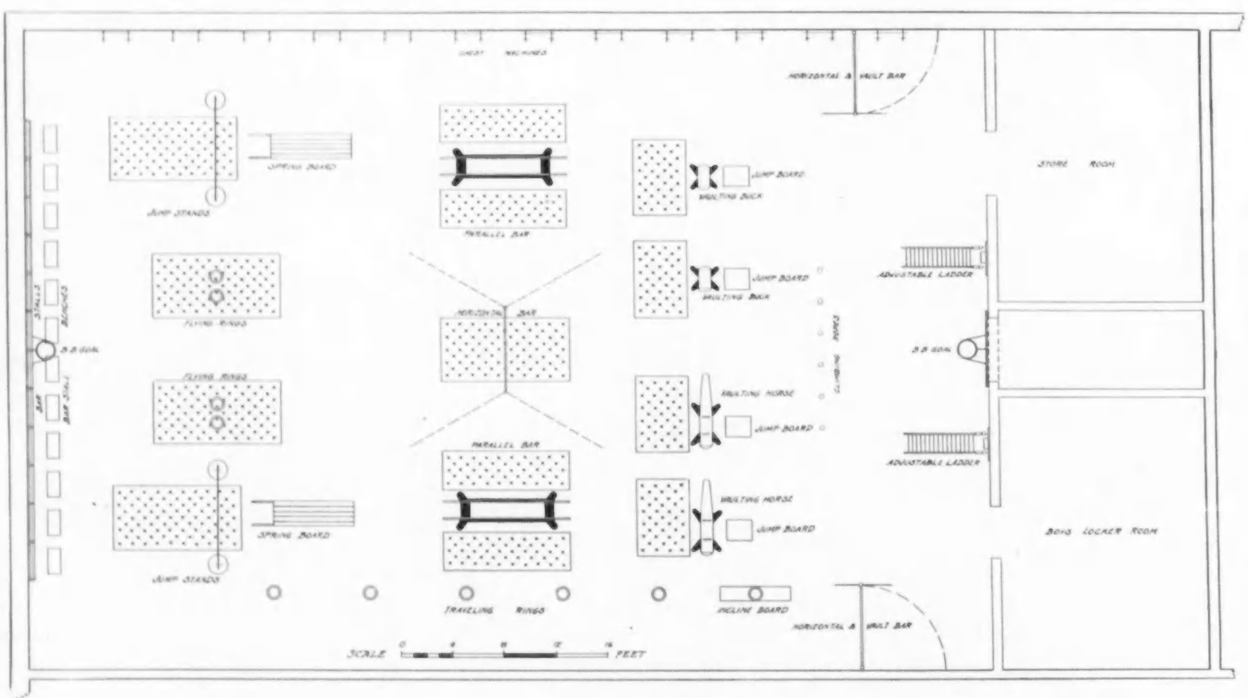
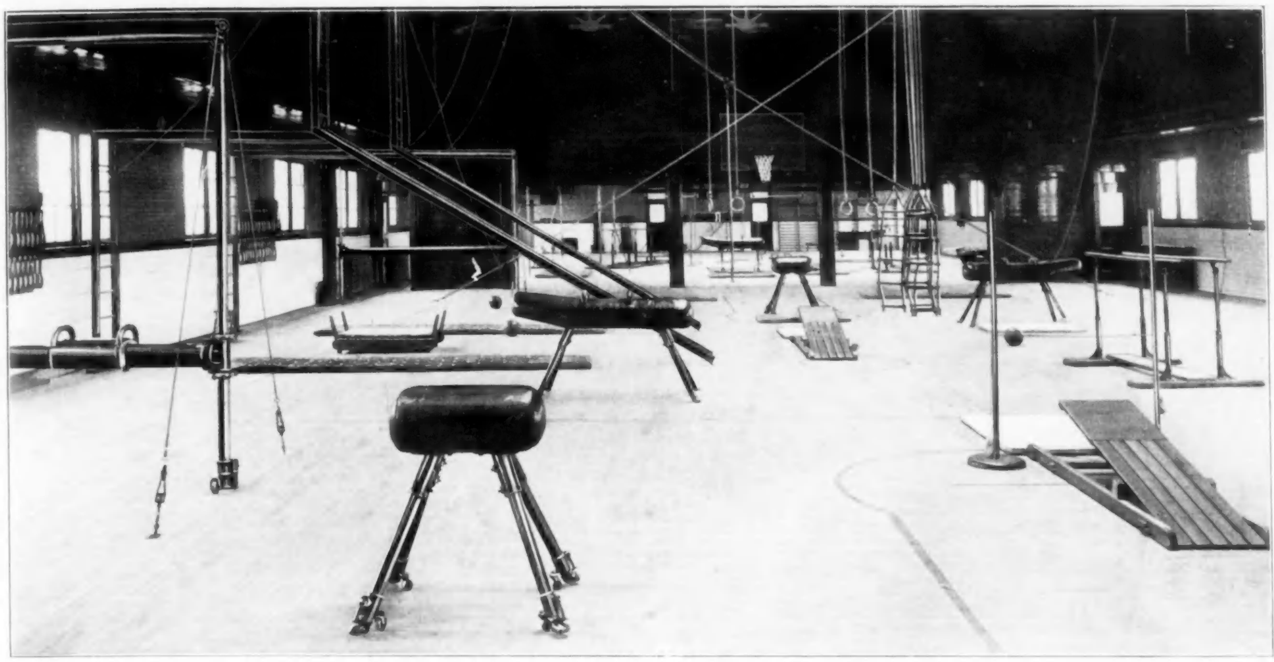


FIG. 20. A BOYS' GYMNASIUM.

Equipment: Twelve sections bar stalls, twelve bar stall benches, two pair jumping standards, two spring boards, two pair flying rings, one suspended horizontal bar, two parallel bars, two vaulting horses, two vaulting bucks, four jump boards, one incline board, six traveling rings, six climbing ropes, two horizontal and vaulting bars, two adjustable ladders, twelve chest machines, one pair basket ball goals, mattresses, miscellaneous small apparatus.



GYMNASIUM FOR MEN AND WOMEN, STATE NORMAL SCHOOL, CEDAR FALLS, IA.

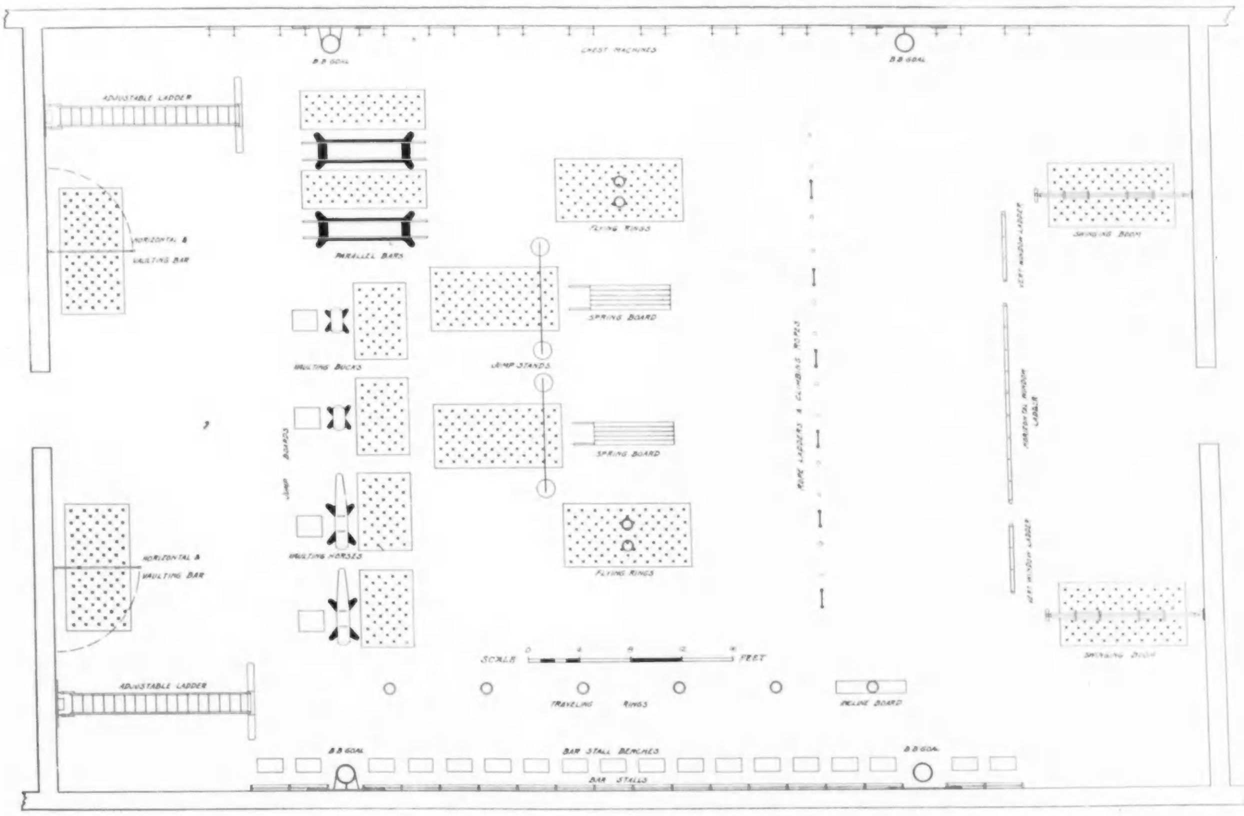
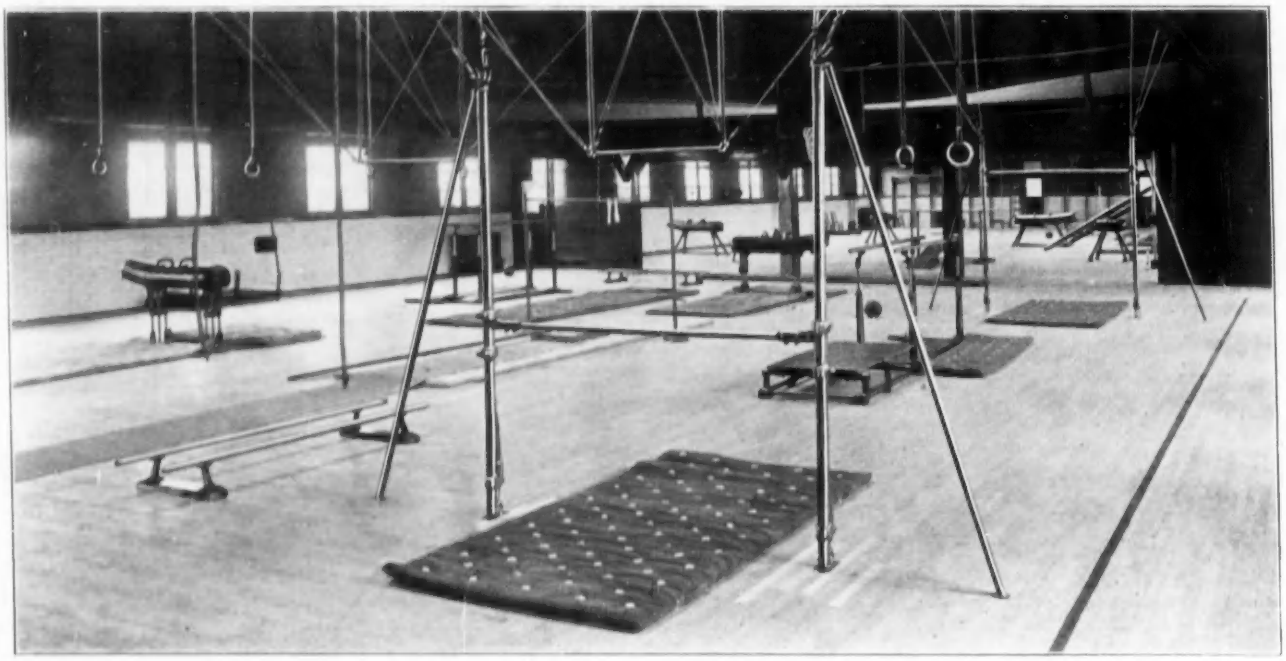


FIG. 21. CO-EDUCATIONAL COLLEGE OR NORMAL SCHOOL GYMNASIUM.

Equipment: Two horizontal and vaulting bars, two adjustable ladders, two vaulting horses, two vaulting bucks, two parallel bars, four jump boards, two pair jumping standards, two spring boards, two pair flying rings, six traveling rings, one incline board, six rope ladders, twelve climbing ropes, one horizontal window ladder, two vertical window ladders, two swinging booms, twelve chest weights, eighteen sections bar stalls, eighteen bar stall benches, two pair basket ball goals, mattresses, miscellaneous small apparatus.



GYMNASIUM FOR MEN AND WOMEN, STATE NORMAL SCHOOL, CEDAR FALLS, IA.

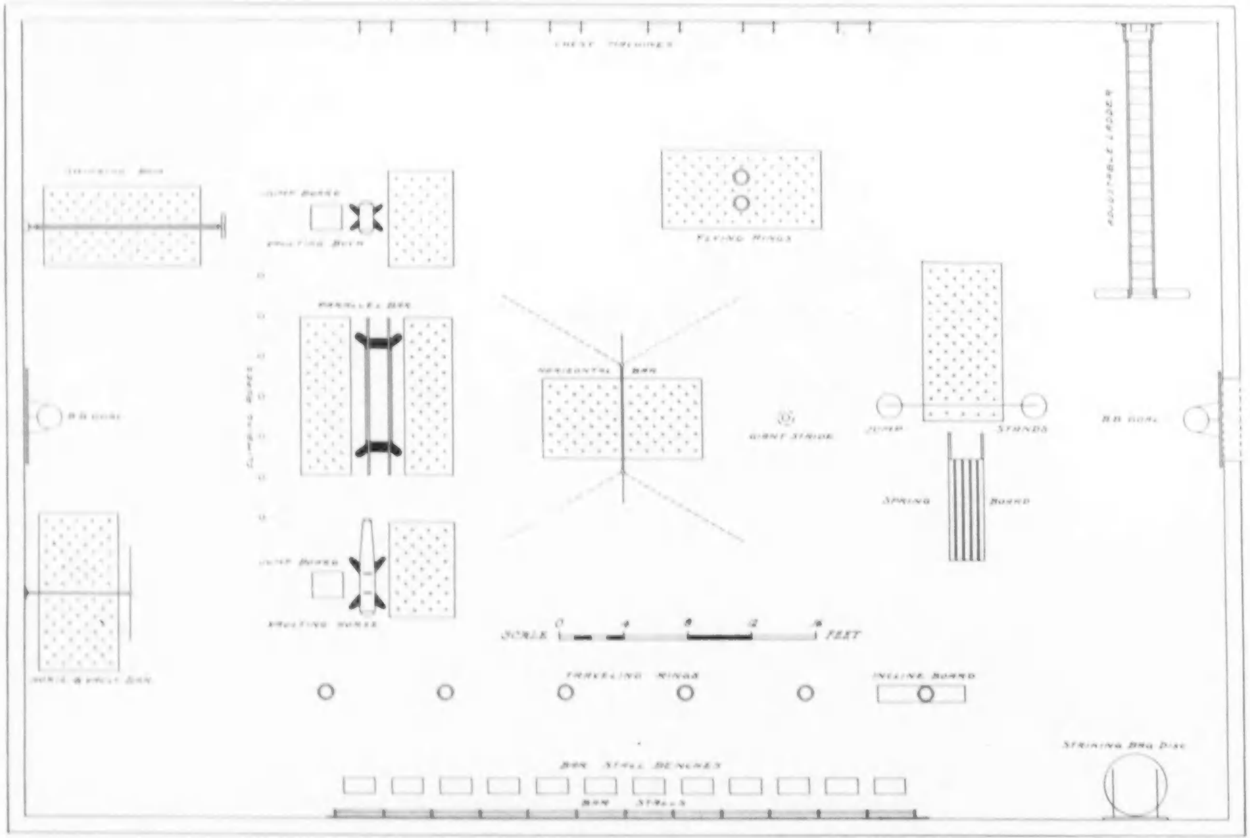
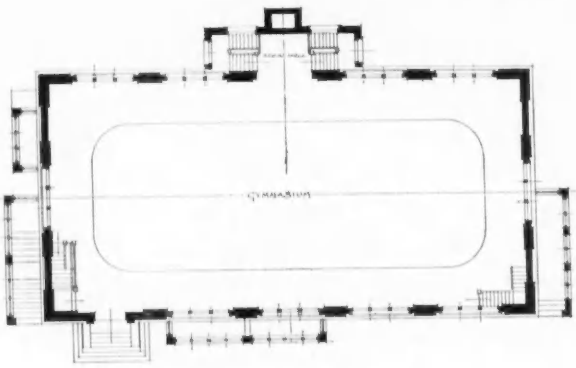


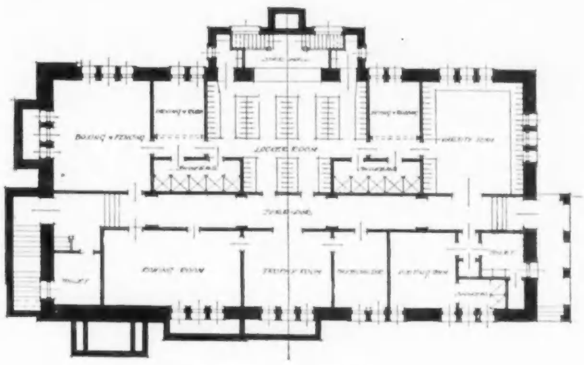
FIG. 22. A CHURCH GYMNASIUM.

Equipment: Twelve bar stalls, twelve bar stall benches, six chest weights, one vaulting horse, one vaulting buck, two jump boards, one parallel bar, one horizontal and vaulting bar, one suspended horizontal bar, one adjustable ladder, six traveling rings, one pair flying rings, six climbing ropes, one giant stride, one striking bag disc, one swinging boom, one pair jump standards, one spring board, one incline board, one pair basket ball goals, mattresses, miscellaneous small apparatus.

NEW GYMNASIUM AT ST. JOHN'S COLLEGE, ANNAPOLIS, MD.
Wyatt & Nolting, Architects.

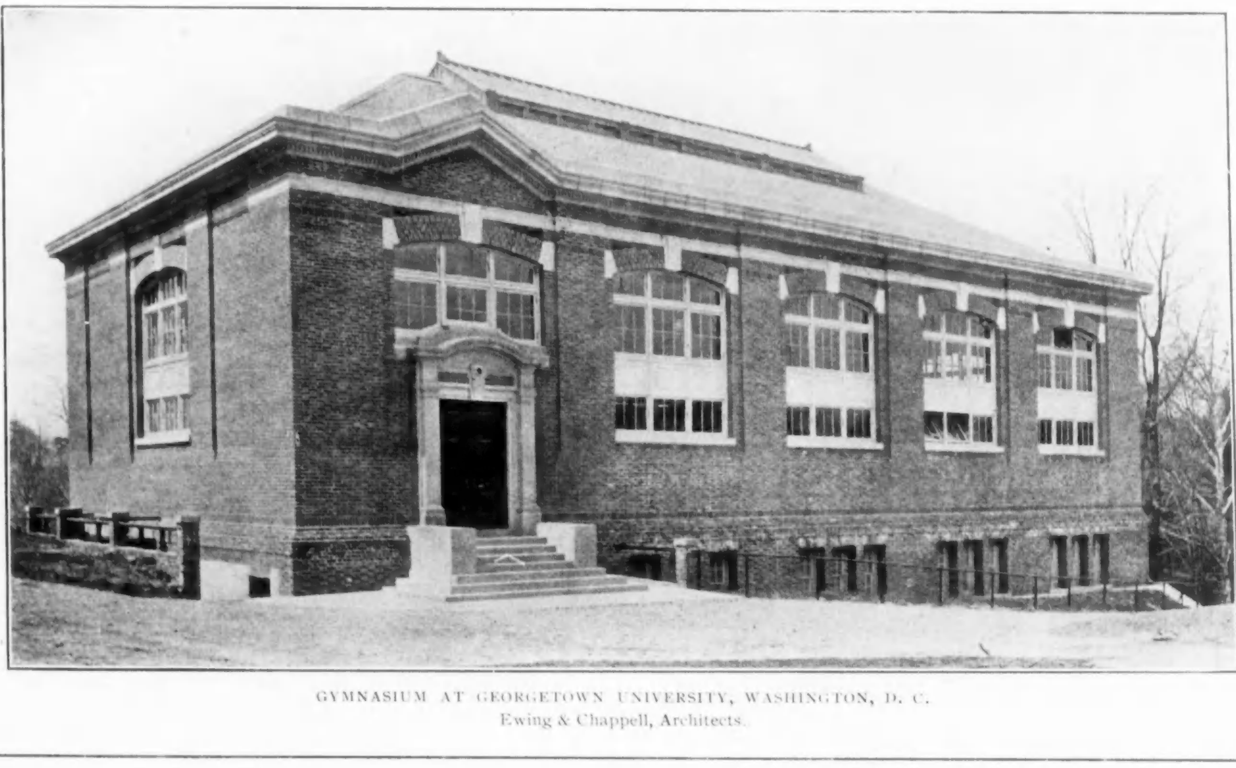


BASEMENT PLAN.



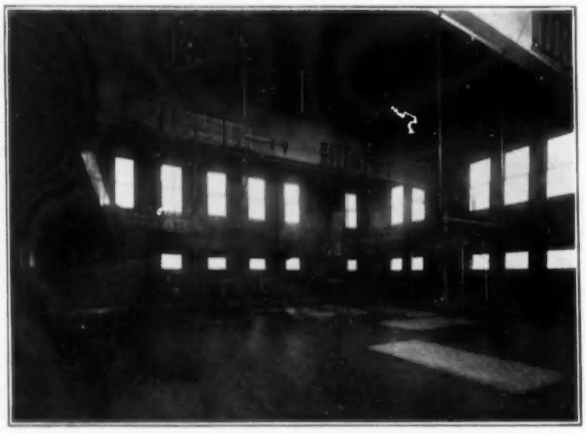
FIRST FLOOR PLAN.

GYMNASIUM AT GEORGETOWN UNIVERSITY.



GYMNASIUM AT GEORGETOWN UNIVERSITY, WASHINGTON, D. C.
Ewing & Chappell, Architects.

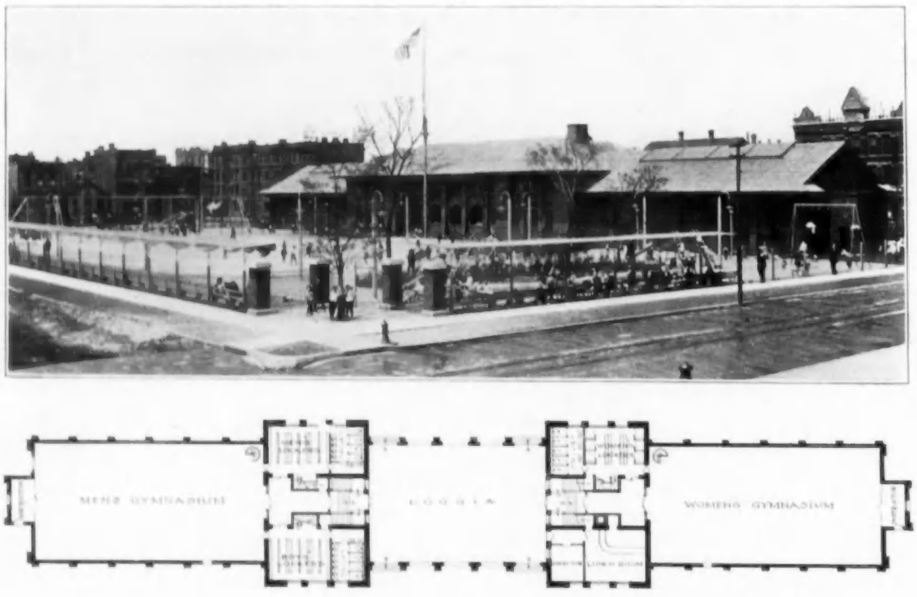
tect and the school board. Schools with one small gymnasium will be as badly off as the school of to-day without a yard. Most of our schools carry the children from primary through the grammar grades. The smaller children should have a good-sized playroom, preferably on the ground floor. This might be equipped with a few pieces of play apparatus such as slides, teeters, and swings. There should be a separate gymnasium for boys and one for girls. It might be said that in a school suffering for room the space of one gymnasium would mean another needed class room or two. Granted that it would increase the school capacity to the extent of one hundred pupils, devoted to gymnasium work it would make it possible to accommodate at least four or five times that number during the average school period, and extend by just that much a branch of educational work, heretofore badly neglected, but now recognized as an important factor in producing the best kind of children. In one case there is a larger plant incomplete. In the other a smaller plant of greatest working efficiency. However the rule may be applied to educational methods commercially there would be no choice.



PARISH HOUSE GYMNASIUM, CHRIST CHURCH, CINCINNATI.

The gymnasiums could both be located on the top floor or possibly the one for the girls midway in the building.

Fig. 18 serves as a type for playroom — plenty of light and air. Fig. 19, a girls' gymnasium and equipment. Fig. 20, a boys' gymnasium and equipment. While I have illustrated in the latter two figures rooms 50 feet by 75 feet it may be understood that 40 feet by 60 feet provides opportunities for good work. It is, of course, desirable to have the greater space if obtainable. In a boys' gymnasium 50 feet by 75 feet it might be found desirable to provide a running track. That may be governed by the individual conditions. I would not suggest a track for an elementary school in any smaller room, and not at all if the room is to be used by both girls and boys.



GENERAL VIEW AND FIRST FLOOR PLAN, GYMNASIUM, SEWARD PARK, CHICAGO.
Perkins & Hamilton, Architects.

There is gradually growing into prominence another sort of educational center in the shape of the municipal gymnasium and playground. I will treat of the equipment of such buildings in my next article, but mention them now as belonging to the co-educational series. The rules applied to public school gymnasiums hold good here. The same congestion prevails and the gymnasiums are apt to be crowded at all open hours. Undoubtedly the best ends are attained where separate provisions are made for men and women, or boys and girls. The object of the public gymnasium is to provide a place where children may go for a better kind of fun than they obtain in the streets. While seemingly social and recreative it really does not belong in that class of gymnasiums because fundamentally it is educational in principle, only the educational pill is homeopathically administered and is sugar coated. This gymnasium, therefore, should be open to all boys and girls when they otherwise would be on the street, and the less its work is curtailed the better its effects. Then also, the problem of administration is greatly simplified where separate provisions are made for the care of both sexes.

Most plans drawn up follow out these lines. I see some, however, from time to time, that unite the two parts and have, therefore, made mention of the subject.

Warming and Ventilating with Special Reference to Hospital Buildings—I.

BY D. D. KIMBALL.

IT IS not possible in an article of this character to cover the entire field involved in the warming and ventilating of hospital buildings, but it is the purpose of the writer to give, in as concise form as possible, a brief treatise on the subject which shall give to the architect and builder a definite idea of the history, literature, practices, and value of ventilation.

An explanation of some well established standards and methods of warming and ventilating as applied to hospital buildings, and some rules and formulas will be given. The elements, forces, and difficulties involved will be briefly considered, and brief references will be made to the subjects of air filtration, air cooling, and relative humidity.

Probably the earliest recorded application of the principles of ventilation was made about the middle of the fifteenth century to the mines of Saxony, it having become necessary to supply fresh air to replace gases which formed and interfered with respiration and use of the miner's lamp. This work consisted of the use of fires in ventilating shafts, and later of large bellows and paddle wheels for the horizontal tunnels. Long before this, however, doctors had realized the need of fresh air for the sick and the importance of a constant renewal of the air supply within the homes of the sick. The development of building ventilation seems to have begun with the work of Sir Christopher Wren in the House of Parliament about 1660. This work went through various stages and was not perfected until about 1835 by Dr. Reid, the old system having been destroyed by fire.

Modern ventilation work may be said to have commenced with the work of Tredgold, an English engineer, who published in 1824 a work of great value, which was revised and reissued in 1835. In France the earliest attempts at building ventilation occurred about 1840 in connection with a Paris hospital, in fact all the earliest attempts at ventilation in France were in connection with hospital buildings.

The subject of ventilation in the United States began to receive consideration about 1849 when the Committee on Public Buildings of the House of Representatives in the State of Massachusetts reported upon the ventilation of Representatives' Hall, a second report being made early the year following.

In 1866 a report was made upon the ventilation of the Halls of Congress, followed by other similar reports on the ventilation of the House of Representatives.

It was not until about 1862 to 1864 that the amount of air really required for ventilation was correctly determined, this being developed as the result of the work of the Army Sanitary Commission in connection with an investigation into the sanitary condition of the English army during the Crimean war.

Dr. Parkes in his manual of Hygiene stated in 1864 that 2,000 cubic feet of air per hour per occupant in a room should be furnished, which coincides with the average present practice.

The earliest literature upon the subject of real interest appeared about 1815. Among the earliest authorities of value are Thomas Tredgold, already referred to; E. Peclet, 1854 and 1861, and M. Pettenkofer, 1858. Among the later authorities of value should be mentioned Wm. J. Baldwin's books on steam and hot water heating, etc., and Professor Carpenter's "Principles of Heating and Ventilation." One of the most convenient books upon heating will be found to be "Steam Heating" by Wm. G. Snow, while for a very complete and general history and discussion of the subject "Ventilating and Heating," by Dr. John S. Billings, will be found most interesting. Among the most valuable contributions to the development of this science will be found to be the transactions of the American Society of Heating and Ventilating Engineers, which record many valuable tables, tests, and discussions. There are a number of current magazines treating more or less extensively of this subject, among which might be mentioned the "Heating and Ventilating Magazine" treating of heating and ventilating work exclusively, and the "Sheet Metal Worker" devoted largely to this subject.

The necessity for providing artificial heat during the fall, winter, and spring of the year is apparent, a lack of heat or a surplus thereof involving discomfort, and both alike endangering health. In the case of hospital warming especially is it most desirable that the temperature should be kept as nearly uniform as possible.

The value of ventilation is still too little appreciated even in hospital work. The word "appreciated" is used advisedly as it is more a lack of appreciation than a matter of real ignorance. It is not uncommon to find a member or members of a building committee, and even an architect, willing to sacrifice the ventilation of a hospital building to save money with which to secure architectural effect, more space, or other equipment. Such a committee or such an architect fails to realize that a hospital without adequate ventilation is little better than a hospital without medicine, and fails to realize also that a hospital properly ventilated will reduce the average number of days required to effect a cure from twenty-five per cent to forty per cent, greatly increase the percentage of cures, and increase the capacity of the same hospital in proportion to the lessened number of days required to effect a cure.

At the S. R. Smith Infirmary at Staten Island a comparison was made in two wards of the same nature, containing the same class of patients, in which case it was found that in the ward without ventilation an average of sixteen days was required to effect a cure, while in the ventilated wards the average was ten days. In the Dublin Lying-In Hospital the death rate under old conditions reached fifty per cent of those born, while for an equal period with improved sanitary conditions the death rate fell to five per cent. It has been reported that in the Boston City Hospital the death rate changed under the improved conditions from forty-four per cent to thirteen

per cent in the surgical wards and from twenty-three per cent to six per cent in the other wards. Such instances can be multiplied, so that there would seem to be as ample reason for the installation of suitable ventilation as for the provision of medicine.

The matter of ventilation involves principally the matter of air supply and it may, therefore, be well to consider the nature and composition of the air and the part which it plays in ventilating work.

The air is made up approximately as follows:

Nitrogen	78.30 parts in 100
Oxygen	20.70 ,, ,, ,,
Carbonic Acid	.04 ,, ,, ,,
Watery Vapor	.01 ,, ,, ,,
Ammonia	Trace

The above varies slightly in different localities, but such variations as are found are apt to be in the greater amount of ammonia and watery vapor which may be found, the latter sometimes forming four per cent of the weight of the air. There may be other gases found in the air but they are usually considered as local impurities. There is also a certain specially active form of oxygen called ozone in an amount which it is difficult to measure.

The process of respiration changes the composition of the air breathed to approximately as follows:

Nitrogen	75 parts in 100
Oxygen	16 ,, ,, ,,
Carbonic Acid Gas	4 ,, ,, ,,
Watery Vapor	5 ,, ,, ,,

The importance of a renewal of the air to supply more oxygen, and also of bringing about the removal of the vitiated air with its products of respiration and emanations from the body as indicated by the carbonic acid gas in the air, will be readily seen by noting the change in the composition of the air as it is discharged from the lungs.

As will be seen from the above the nitrogen forms the bulk of the atmosphere. It is practically inert in the processes of combustion and respiration, excepting so far as it takes up some heat and renders the oxygen less active. Ozone, which is of more recent discovery, may be considered practically as oxygen. The solid matter and bacteria found in the air will be referred to later under the subject of air filtration.

The two elements which are of the most interest in a discussion of the subject of ventilation are carbonic acid gas, referred to below, and the oxygen, the latter being universally known to be necessary to the burning of a candle or the maintenance of life.

A fire may be put out by an extinguisher which will largely increase the carbonic acid gas in the air, and likewise the process of oxidization in the body is arrested if the amount of carbonic acid gas in the air is unduly increased or the supply of oxygen is stopped or seriously diminished.

Oxygen is that element in the air which is of the greatest importance to human beings. It is essential in both heating and ventilating work, being the active element in combustion and in the similar processes which go on within the human lungs where it acts upon the carbon and impurities in the blood, forming chemical compounds which are thrown off during respiration. As the oxygen is essential to life and is contained in the air, there must be a sufficient amount of fresh air supplied to give the necessary oxygen.

Because a room is large and contains a large amount of air for each occupant does not lessen the importance of ventilation if the room is to be occupied for any considerable length of time, for the air within the room will soon become vitiated and must be removed and replaced. In a room containing 1,000 cubic feet of air, per occupant, less than one hour is required to so impoverish the air that it will contain twelve parts of carbonic acid gas in 10,000 parts of air if no fresh air is supplied. A lack in the supply of fresh air brings about a diminished amount of oxygen and an increased amount of carbonic acid gas; that is, it lessens the upbuilding elements while increasing the destructive forces. Physical energy is a direct result of oxidization of carbon within the body, and mental energy is quite as dependent as physical energy upon the supply of pure air. The withdrawal of a quantity of oxygen from the air equal to one five-hundredth of its volume reduces the luminosity of a candle light one twentieth, and the vital energy of the human being suffers quite as much.

A standard temperature of 70° for an occupied room is generally accepted, and there is no reason why there should not be an equal insistence upon a standard as to the quality of air, for there is no difficulty in determining the proper quality of the air to be breathed or in procuring such air.

The following paragraph is quoted from Professor Carpenter's book:

"The breathing of impoverished air results of necessity in the dulling of the vital fire in the body and the keen edge of intellect. It means a weakened body and a dulled mind. A lowered vitality of the body, besides exposing it to an increased liability to communicated, contracted, or constitutional disease, also impairs its effectiveness as a vital mechanism. The aggregate of physical and mental vitality lost through ignorance or indifferent regard, and even culpable disregard of the exact and delicate dependence of the activities of body and mind on the maintenance of a normal, including atmospheric environment, surpasses all common conception or belief. That air quality is fully as important as food quality in the production of vital energy is a conception which has yet to be borne in upon the public, if not the professional belief and conscience."

The air supply should be as carefully considered in the selection of a home, school, or hospital as the question of food supply. The evil effects of long-continued breathing impure air are not such as to attract immediate notice unless the impurity is great or the condition as to temperature and moisture are such as to produce immediate discomfort. The injury inflicted upon the system by breathing air deficient in oxygen or otherwise contaminated is only noticeable after a lapse of time and is then more often assigned to other causes. By careful and long-continued study the bad effects of breathing foul air have been fully demonstrated, demonstrated beyond dispute, by comparing the results of the occupancy of well ventilated and poorly ventilated prisons, ships, barracks, hospitals, etc.

Ventilation in a hospital is of greater importance than elsewhere for the reason that the patients therein are in a weakened, exhausted, and enervated condition and are, therefore, especially susceptible to the effects of impure air or unsanitary surroundings. Shocks due to accidents, or a collapse sometimes attending surgical operations, reduce the vitality and render the patient unusually susceptible to lack of proper surroundings. The vital resistance is diminished or in some cases apparently lost, making necessary the most helpful of sanitary conditions.

The liability of the spread of disease by contagion or infection is greatly increased by insufficient ventilation. Diseases of the respiratory tract are especially aggravated by defective ventilation.

The demand for proper ventilation would seem to be part of a general desire for cleanliness. Few of us would care to put on underclothing immediately taken from another person or put into our mouths articles of food and drink which have been in other people's mouths, yet we take into our lungs with but little or no hesitation the air that has but just come from other people's mouths and lungs or from close contact with their soiled clothing or bodies.

The evidence of results obtained in buildings properly ventilated is constantly reducing the number of those who oppose proper provision for good ventilation in public buildings and particularly in hospitals. Nevertheless such cases frequently occur and only very recently has a case occurred where a member of a building committee opposed proper ventilation methods because the cost of installation seemed great, and it is to be regretted that the architect seemed to approve of the position of this committeeman for no better apparent reason than that he needed the money for use in the construction of the building. This committeeman's argument was that he had no special ventilating system in his home, yet the members of his family when sick seemed to get well just the same, entirely neglecting the fact that in the case of the hospital there are many sick people confined as against the one in the home, and that the one sick person in the home has the constant attention of one or more people, while in the case of the hospital there are many patients dependent upon the care of comparatively few nurses who know nothing about ventilation and give no attention thereto. The statement offered does not prove that the sick one would not have obtained a quicker recovery had there been a proper system of ventilation in the home, nor does the fact that death did not ensue offer proof that another under similar conditions would not have died or at least have suffered severely for lack of proper ventilation. The further fact is overlooked that usually the entire cubic contents of the house may be considered as applied to the patient in the home as against perhaps 1,000 cubic feet of space per patient in the hospital.

The further argument was offered that the windows could be used, thus securing natural ventilation. No adequate ventilation can be obtained from windows in cold weather without subjecting the patient to most dangerous drafts, as the air obtained therefrom is necessarily cold and heavier than the air within the room.

The statement that money was not available for ventilation might just as well be applied to the supply of medicines. It would be better to utilize less expensive construction or build a slightly smaller hospital properly ventilated, which would accomplish more than the larger building lacking ventilation.

Complaint that the system of warming and ventilation as designed is complicated is unfortunately true in a few cases, and the engineer designing a system which is complicated and difficult to operate is to be condemned, whether the hospital be small or large. This, however, is not a good reason for condemning ventilation as a whole, as a system may be designed for even a large hospital which will be simple and readily operated. The further statement that the system will not be used if installed is without value as affecting this matter, for the same statement might be applied to the medicines or the other equipment of the hospital, to the shame of those in charge.

If much has been made herein of the importance of this matter it is because it is felt that too frequently the architect, as well as the committeeman, lacks a proper appreciation of the importance of the subject. The architect is the professional adviser of the owner and should see to it that a thing so vitally affecting the purpose of the building receives proper consideration.

This lack of appreciation is often the greatest difficulty encountered in the design of proper ventilating systems. It is often allied to another difficulty, that of a lack of sufficient funds with which to provide for ventilation after satisfying the owner's demand for space and ornamentation of the building.

Another serious difficulty is often found in the unwillingness of architects or owners to grant sufficient space, properly located, for the installation of flues, registers, or radiators.

Poor building construction will frequently involve the heating engineer in trouble, particularly in the matter of loosely fitting windows or window frames. It has been demonstrated by tests that the difference between windows loosely fitted and windows properly fitted with metal weather stripping is such as to permit of a reduction in certain cases of as much as twenty-five per cent of the radiation surface that would be installed if windows were without stripping.

Too great care cannot be used in the selection of materials used in the installation of the heating and ventilating system. This statement is not intended to give warrant to the selection of materials which are unnecessarily expensive, but inasmuch as the heating and ventilating system constitutes the working element of the building it is of special importance that only good materials be used. It is better that less marble or limestone be used in the ornamentation of the building, or that less space be enclosed, than that the success or life of this important part of the building should be endangered.

The warming of a building involves the warming of the air contained therein, the warming of the walls, furniture, etc., and the furnishing of sufficient heat to make good the losses through and about the windows, through the walls, and heat losses due to ventilation.

The ventilation of a building, particularly a hospital, involves the introduction of a constant quantity of fresh air, in such a way as to give a thorough distribution throughout the building without drafts.

The point at which the fresh air is taken from the outside must be selected with a view to securing air as free from dust or other impurities as possible rather than with a view of its nearness to the heating surfaces.

A complete ventilating system may involve a filter system or humidifying system, and if the building be so located that it is desirable to use the building during the summer without opening the windows, because of the quality of the air in the vicinity, it may be necessary to provide methods of filtering, dehumidifying, and cooling.

Frequently the heating effects of gas lights must be taken into consideration, as well as heat gains from the occupants of the room which amount to approximately 400 B.T.U. per hour per occupant. An ordinary gas jet (16 candle power) will give off 3,000 B.T.U. per hour; a Wellsbach 640 B.T.U. per hour; a 1,200 candle power arc lamp 3,600 B.T.U. per hour, and a 16 candle power incandescent light 160 B.T.U. per hour; while a 5 foot, 16 candle power gas light vitiates as much air as four adults.

The heating effect of electric lights and persons occupying a room are well illustrated in a test recently made in a theater while occupied. The air entered the building from the outside at 48°, picking up a sufficient amount of heat from the ducts, walls, and floors before entering the room to raise it to 54° at the point of discharge in the floor, and the temperature was further raised to 70° during its passage to a point six feet above the level of the floor, all without the use of any part of the heating system.

There are many refinements in calculation which are important in the case of the large work but which are ordinarily neglected, as for instance the increase in volume of air as it is warmed. Assuming that 1,000 cubic feet of air at zero degrees Fah. is taken in through the fresh air intake and is raised 120° in passing through the heater its volume is increased to approximately 1,260 cubic feet. After reaching the room and becoming diffused it quickly cools to 70°, at which its volume becomes approximately 1,100 cubic feet. It will, therefore, be seen that the amount of air actually secured for ventilating purposes depends on the point at which it is measured. Ordinarily it is perfectly safe to neglect this change in volume if the air is measured at its lower temperature, excepting in the adjustment of volume dampers applied to individual rooms, in which case such corrections may be required as to insure a slight excess of entering air over the air exhausted in order to secure a plenum condition in the room which will aid largely in preventing indrafts through the windows, etc.

The formula used in making such a correction is as follows:

Let V = the original volume of air;
V_1 = the final volume of air;
T_1 = original absolute temperature;
T_2 = final „ „

$$\text{Then } V_1 = \frac{V\,T_2}{T_1}$$

Absolute temperature equals 460° plus the number of degrees above zero at which the air is measured.

In the case of the air introduced to and exhausted from a room the air is usually breathed at approximately 70°, at which temperature it may be properly measured.

A theoretical discussion of flues, fans, radiator efficiencies, and the hundred and one other details involved in warming and ventilating engineering may not be undertaken within the limits of a discussion of this nature, but concrete methods with definite rules, formulas, and tables as will be most frequently required in the practice of such engineering will be given.

The proper temperature for living rooms, school, and similar rooms is ordinarily considered to be 70°. The relative humidity, however, has much more to do with comfortable temperature than is generally supposed, and this matter will be referred to later. With a proper relative humidity there is no question but what a temperature of 68° would be better than 70° for the class of rooms above mentioned, and there are many homes and some schools in which this, and sometimes less, is maintained as a standard. In England, with its more humid climate, 60° is the usual standard. For churches and other auditoriums, where people are inclined to sit with more or less of their wraps upon them, a temperature of 62° and sometimes even 60° is quite sufficient, while in gymnasium drill halls, etc., a temperature of 60° or less is satisfactory. In hospitals the temperature should ordinarily be 68° to 70°, except in special cases where a less temperature is desirable, and in such places as operating rooms and their connecting rooms, in which a temperature of 85° is desirable with methods provided for raising this to 98° if necessity arises, as in a case of shock to the patient.

Certain hot rooms in hot baths are maintained at 160° to 180°. In this connection it is interesting to note that while one may enter a room at this temperature, it is impossible to stand water at a temperature over 120° because of the more rapid transmission of heat in the case of the water.

The temperature of occupied rooms should be uniform, and the requirements of the Massachusetts statute that there shall not be a variation of more than 3° in the different parts of a school room is not unreasonable. Indeed in hospital work this is more than would be permissible.

Tests of Brick Columns and Terra Cotta Block Columns.

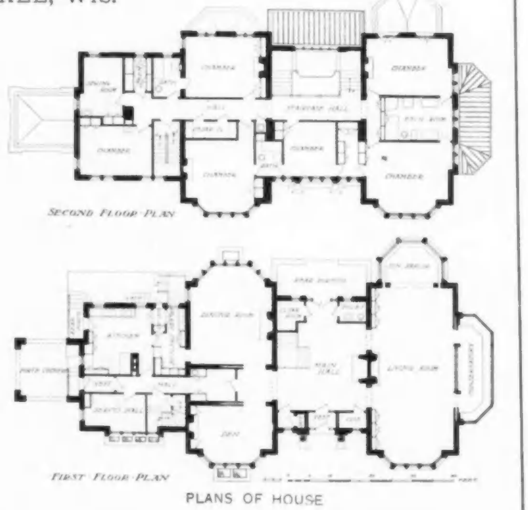
ARCHITECTS and engineers will be interested in a publication of the Engineering Experiment Station of the University of Illinois on the properties of brick and of terra cotta block in compression, as determined from experimental work carried on in the materials testing laboratory. The publication is Bulletin No. 27, Tests of Brick Columns and Terra Cotta Block Columns, by Arthur N. Talbot and Duff A. Abrams. It gives the results of tests of a number of piers or short columns built under a variety of conditions. Hard and soft bricks and blocks were used; and lime mortar, natural cement mortar, and lean and rich Portland cement mortar were tried. The effect of indifferent workmanship was determined. Both central and eccentric loadings were used.

HOUSE, LAKE DRIVE, MILWAUKEE, WIS.

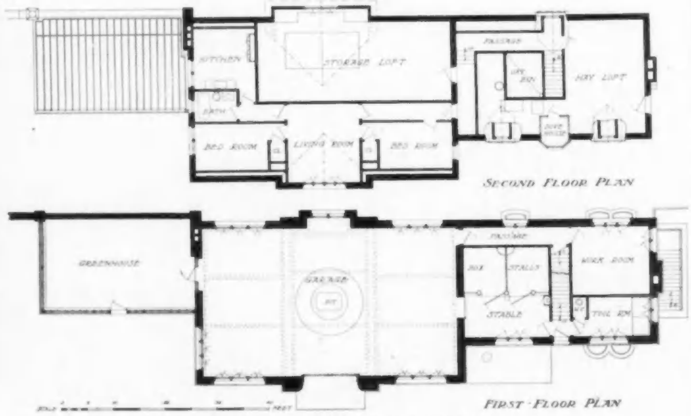
KIRCHHOFF & ROSE, ARCHITECTS.

HOUSE, STABLE AND GARAGE, MILWAUKEE, WIS.
KIRCHHOFF & ROSE, ARCHITECTS

DETAIL OF MAIN ENTRANCE TO HOUSE.

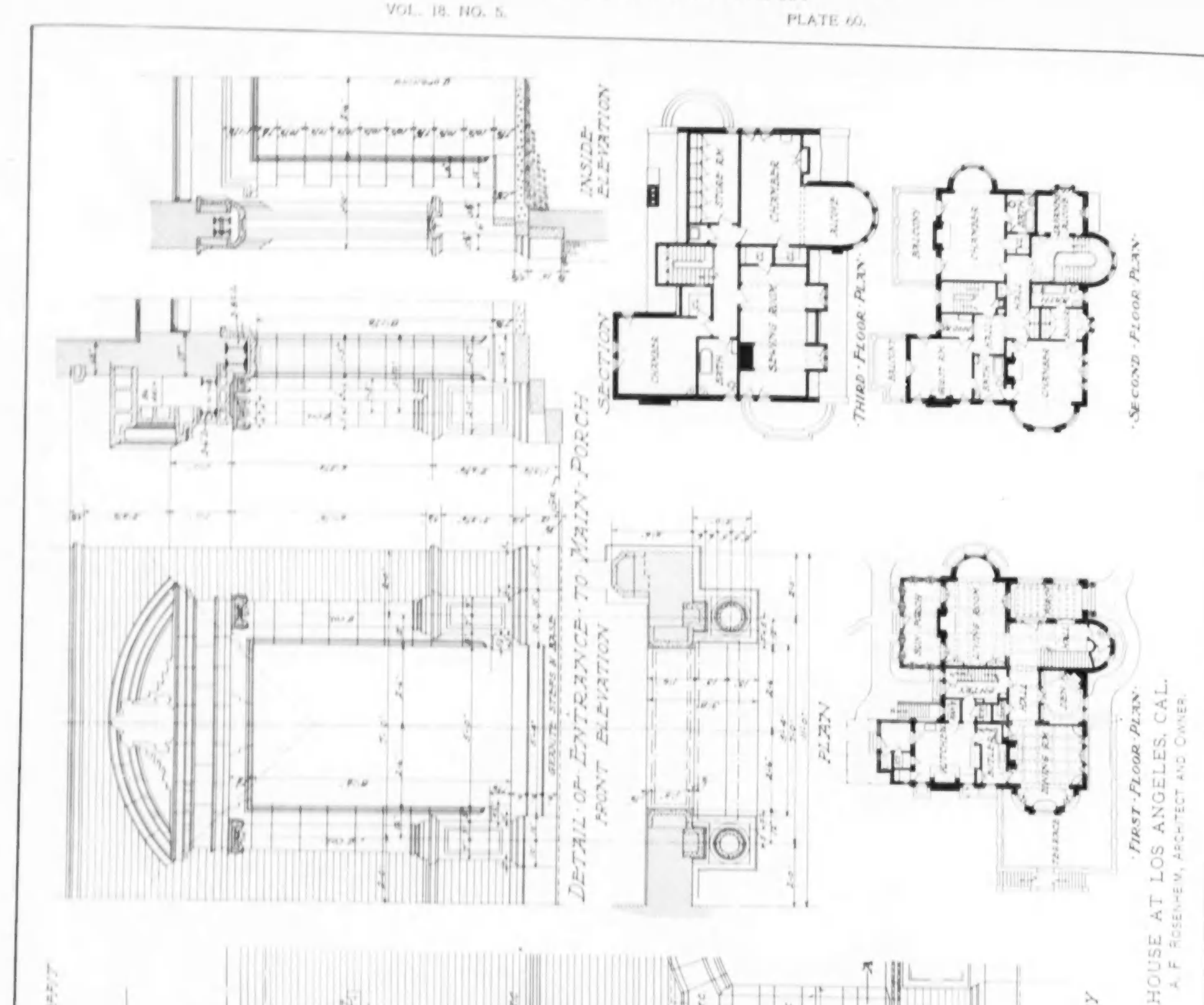


PLANS OF HOUSE



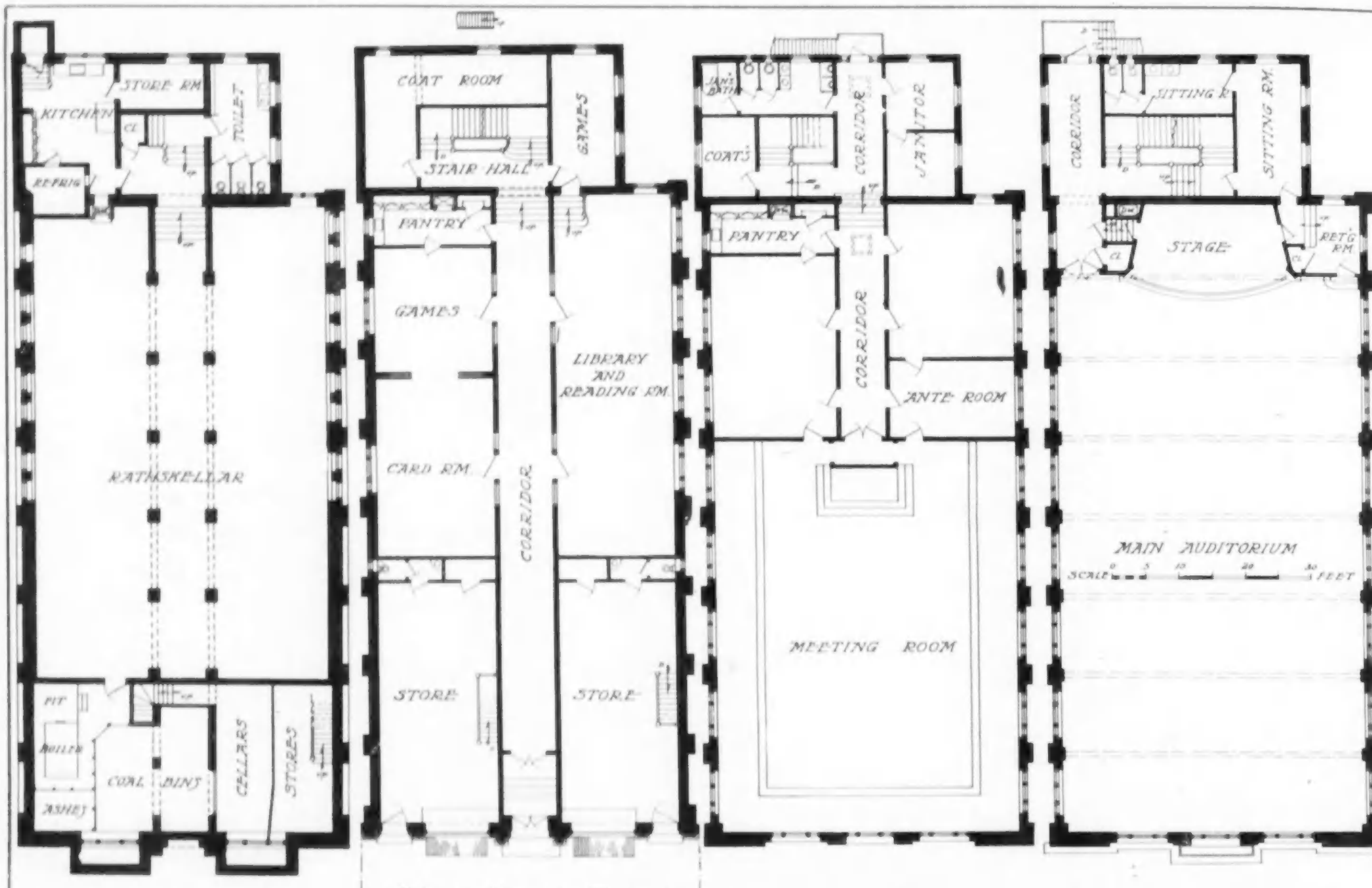
PLANS OF STABLE AND GARAGE.

HOUSE AT LOS ANGELES, CAL.
A. F ROSENHEIM, ARCHITECT AND OWNER.


INSIDE ELEVATION
SECTION
DETAIL OF ENTRANCE TO MAIN PORCH
FRONT ELEVATION
PLAN
THIRD FLOOR PLAN
SECOND FLOOR PLAN
FIRST FLOOR PLAN
HOUSE AT LOS ANGELES, CAL.
A. F. ROSENHEIM, ARCHITECT AND OWNER.
HALF PLAN OF BAY
HALF PLAN SOFFIT
ELEVATION OF FRONT PORCH & BAY
PLAN AT A-A
SECTION

DETAILS OF ENTRANCE PORCH.

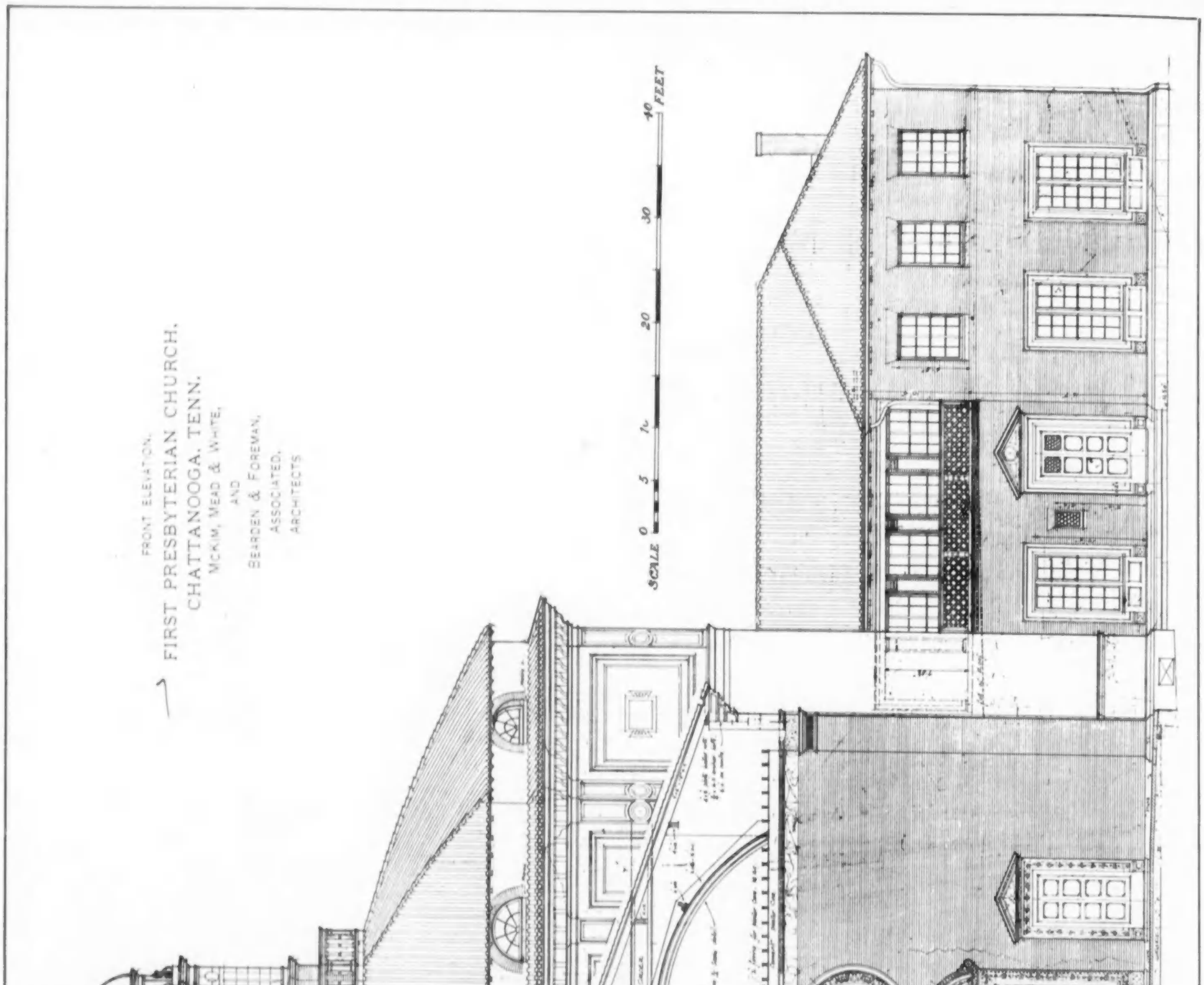
HOUSE AT LOS ANGELES, CAL.
A. F. ROSENHEIM, ARCHITECT AND OWNER.

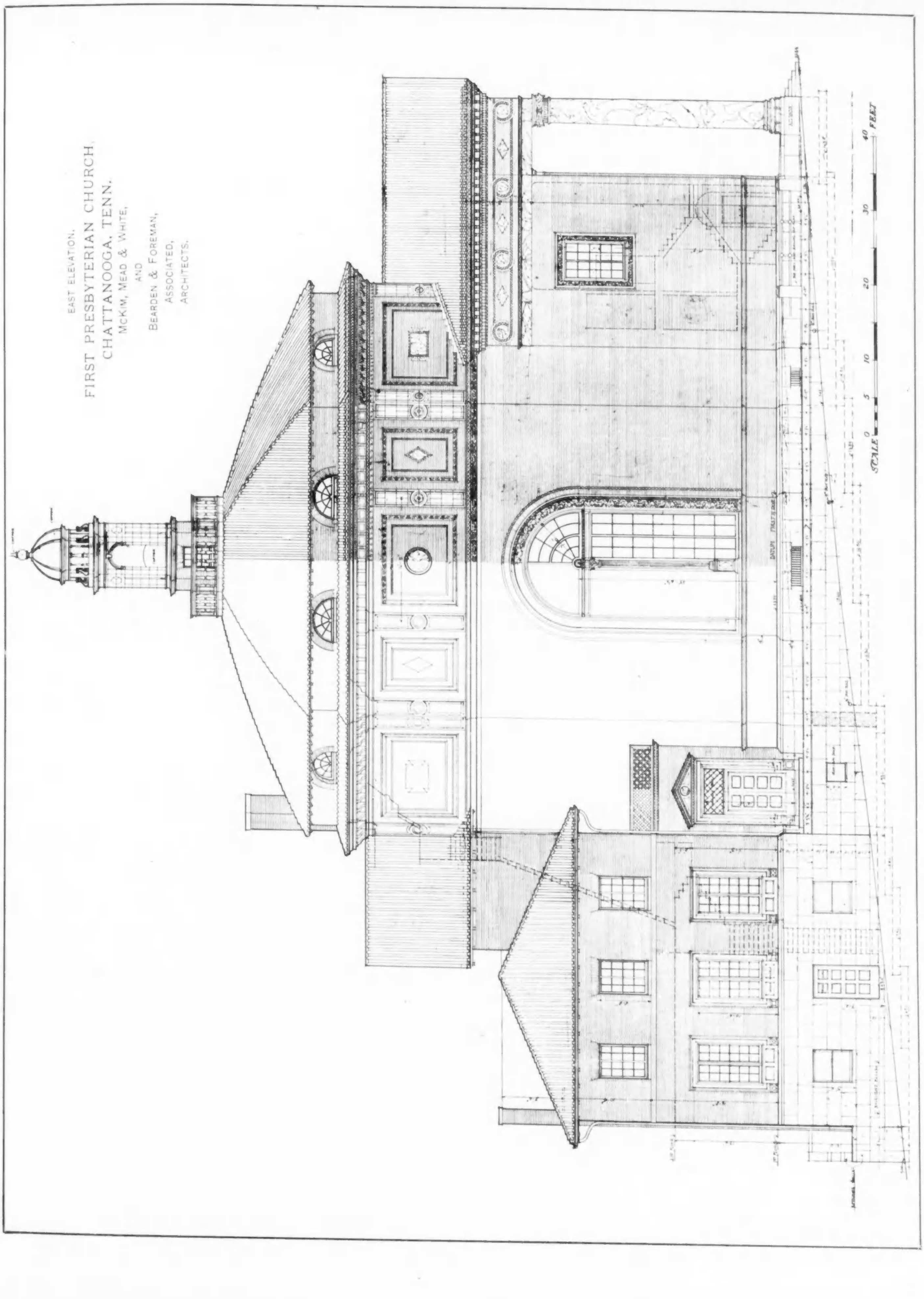


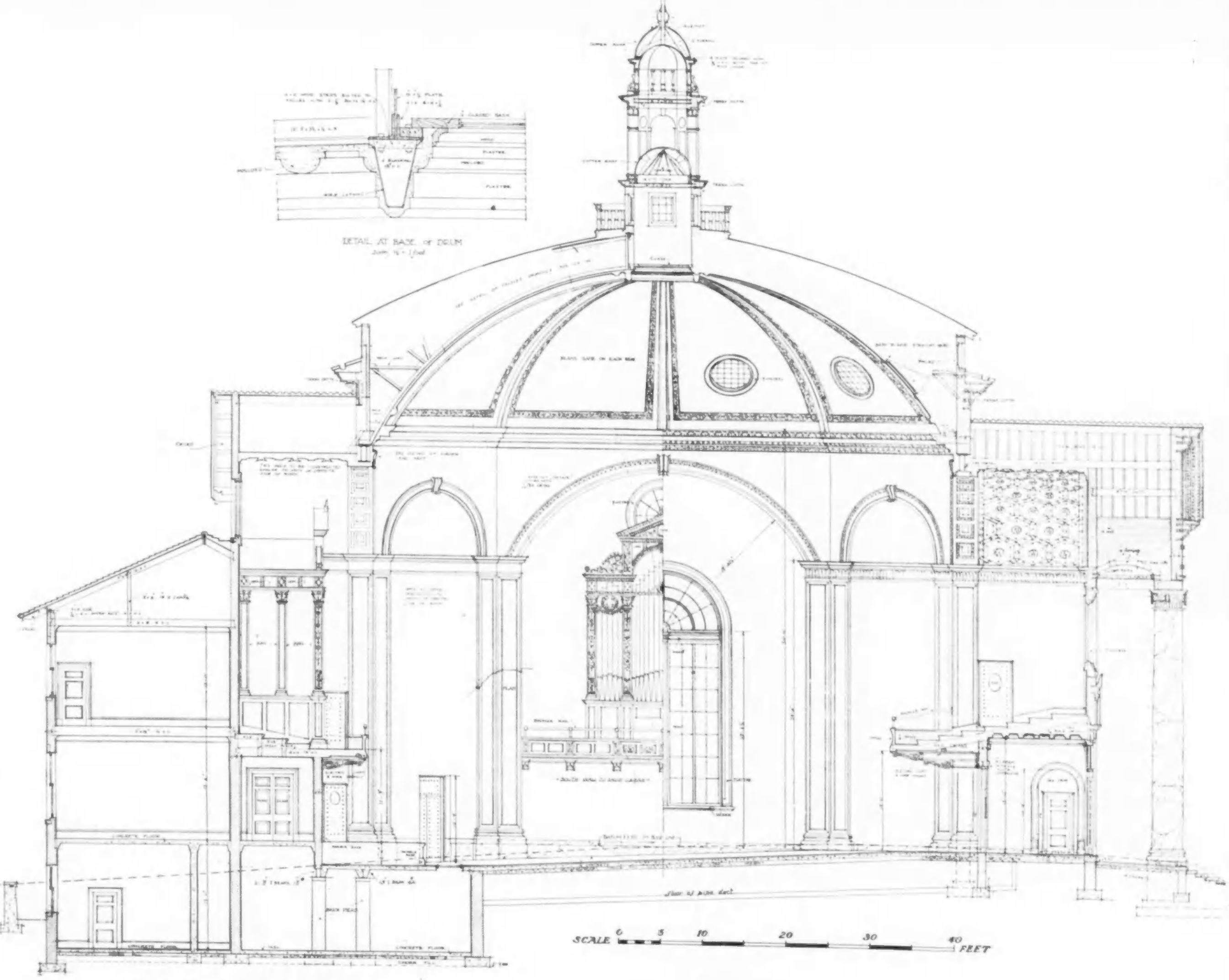
·BASEMENT· PLAN· ·FIRST· FLOOR· PLAN· ·THIRD· FLOOR· PLAN· ·SECOND· FLOOR· PLAN·

BUILDING FOR THE FRATERNAL ORDER OF EAGLES, CAMDEN, N. J.

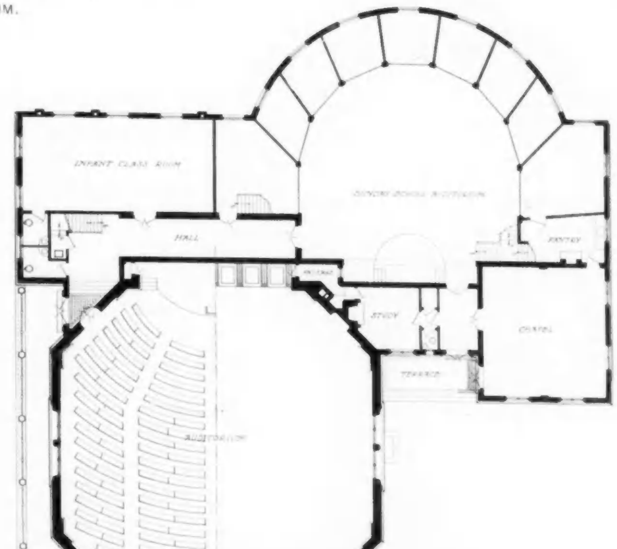
THOMAS, CHURCHMAN & MOLITOR, ARCHITECTS.


FRONT ELEVATION,
FIRST PRESBYTERIAN CHURCH,
CHATTANOOGA, TENN.
MCKIM, MEAD & WHITE,
AND
BEARDEN & FOREMAN,
ASSOCIATED,
ARCHITECTS.
SCALE 0 5 10 20 30 40 FEET


EAST ELEVATION.
FIRST PRESBYTERIAN CHURCH,
CHATTANOOGA, TENN.
McKIM, MEAD & WHITE,
AND
BEARDEN & FOREMAN,
ASSOCIATED,
ARCHITECTS.
SCALE 0 5 10 20 30 40 FEET



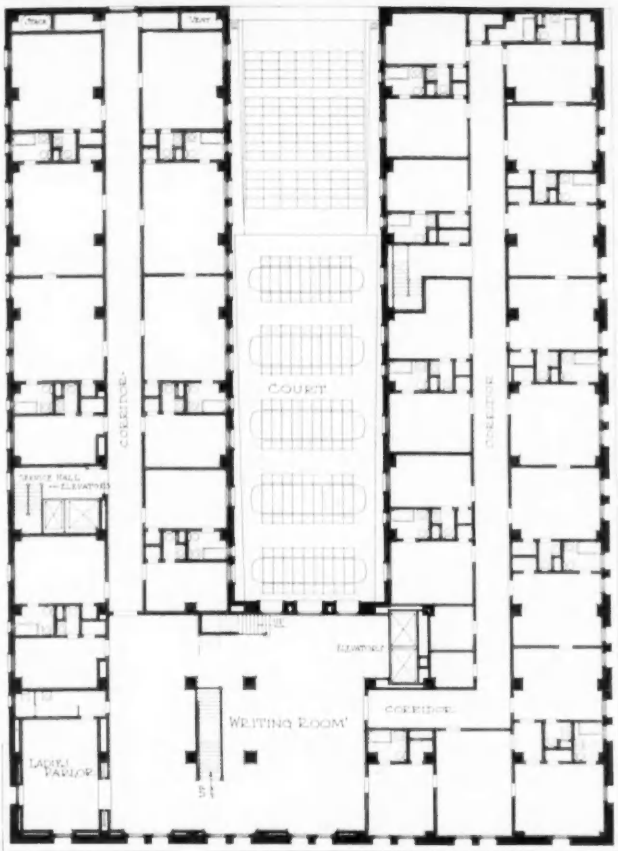
SECTION THROUGH AUDITORIUM.



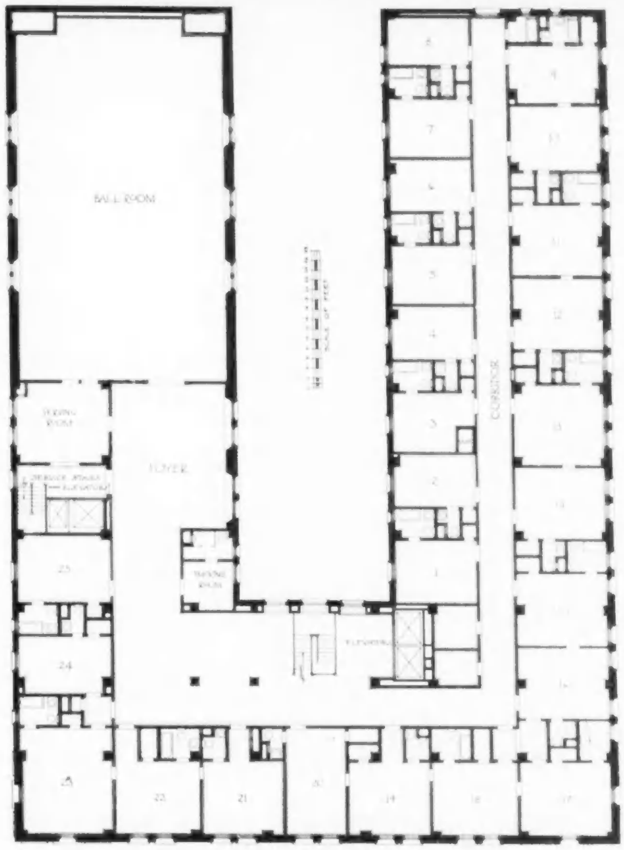
FIRST PRESBYTERIAN CHURCH, CHATTANOOGA, TENN.

McKIM, MEAD & WHITE, AND BEARDEN & FOREMAN, ASSOCIATED, ARCHITECTS.

HOTEL SECOR, TOLEDO, OHIO.
GEORGE S. MILLS, ARCHITECT.



SECOND FLOOR PLAN.



NINTH FLOOR PLAN.

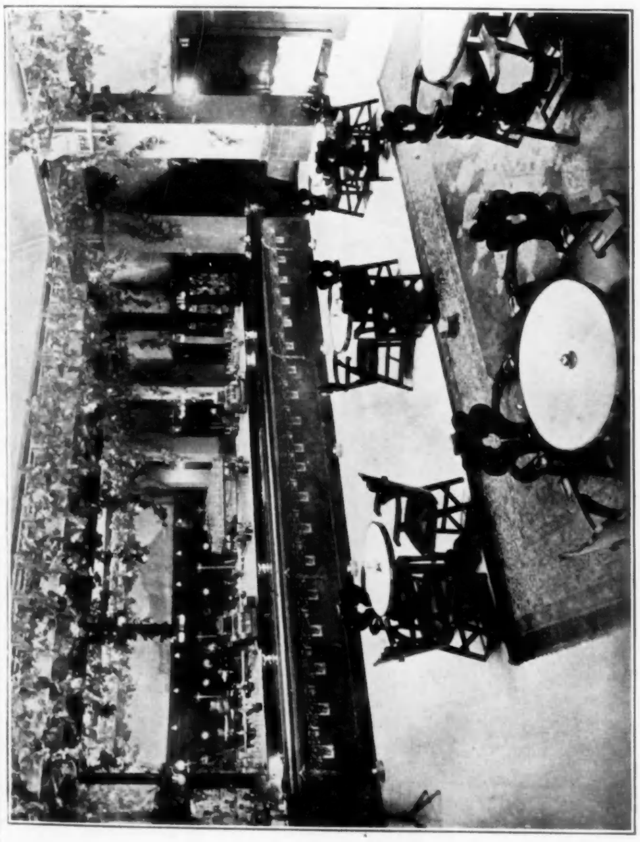
ALSO TYPICAL, EXCEPT THAT SPACE OCCUPIED BY BALL ROOM SUITE CORRESPONDS WITH RIGHT WING.

BASEMENT PLAN.

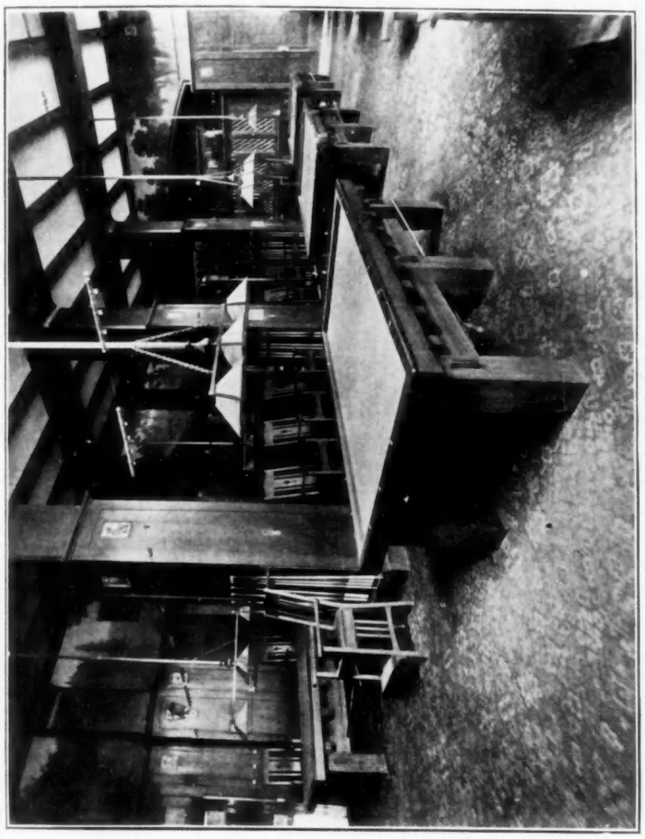
FIRST FLOOR PLAN.

FLOOR PLANS, HOTEL SECOR, TOLEDO, OHIO.

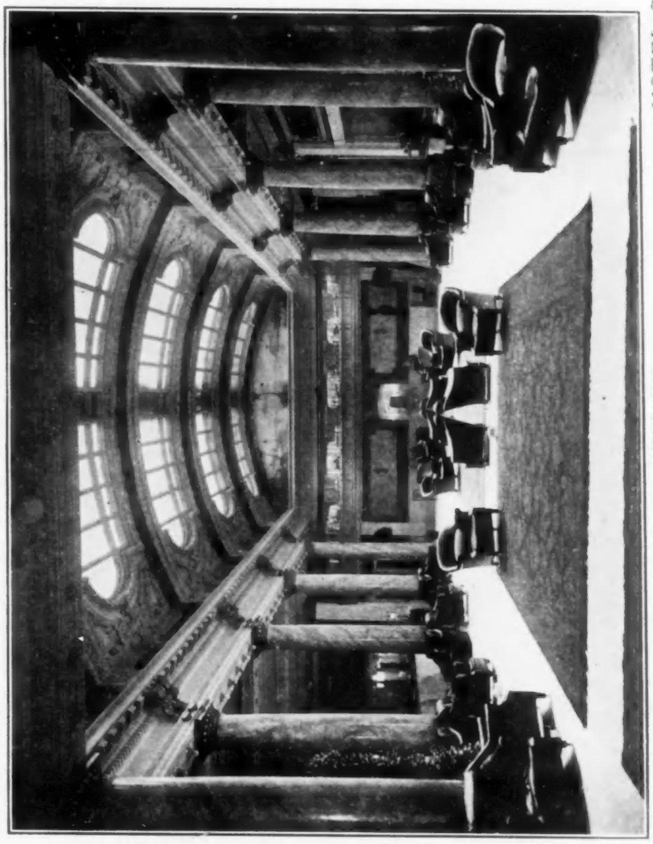
GEORGE S. MILLS, ARCHITECT.



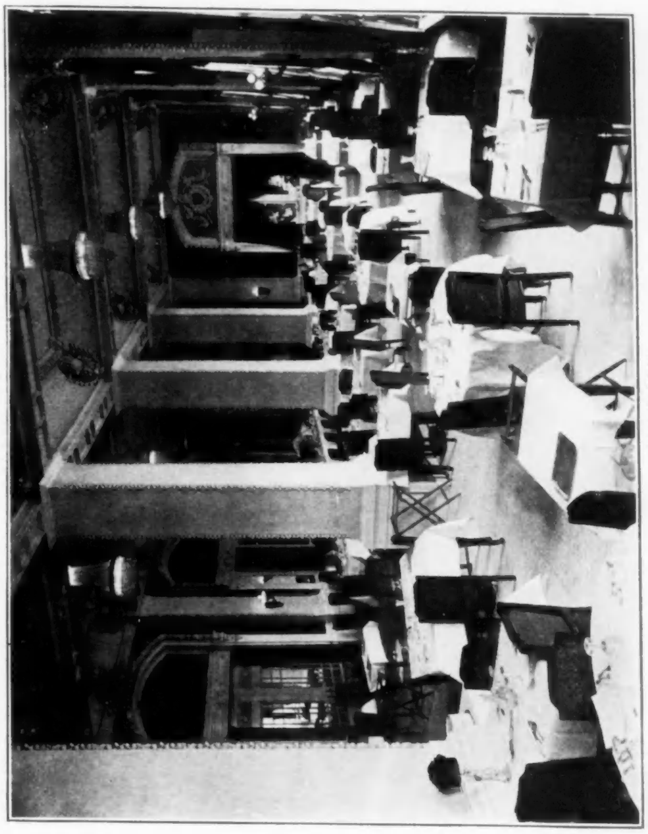
BAR ROOM.



BILLIARD ROOM.



MAIN LOBBY.



DINING ROOM.

HOTEL SECOR, TOLEDO, OHIO.

GEORGE S. MILLS, ARCHITECT.

FLOOR PLANS, CLUBHOUSE FOR THE EXCELSIOR CLUB, CLEVELAND, OHIO.

LEHMAN & SCHMITT, ARCHITECTS.

CLUBHOUSE FOR THE EXCELSIOR CLUB, CLEVELAND, OHIO.
LEHMAN & SCHMITT, ARCHITECTS.

In the central loading columns of high-grade building brick laid with rich Portland cement mortar carried from 3,220 to 4.110 pounds per square inch, and the results ranged down to 1,360 pounds per square inch for columns laid in lime mortar and 1,030 pounds per square inch for columns of soft brick laid in rich mortar. The terra cotta block columns carried from 2,700 to 3,790 pounds per square inch. The columns were found to fail at much lower loads after repeated loading than when a single application of the load was used. The tests under eccentric load show that the columns resist eccentric loading well, following closely the laws of mechanics of materials.

The fact is brought out clearly that the stronger the individual brick or block the stronger the masonry, and that the strength of the mortar used affects largely the resisting strength of the structure. It is also evident that the better the individual piece the more important it is to have a mortar of high resisting strength. Clay workers and builders will be interested in seeing how much gain in strength of structure is obtained with the higher grade of brick and also in the great advantage found in the use of a rich, strong mortar. The effect of the attempt to represent hurried or careless workmanship in laying up work was a loss in strength of say, fifteen per cent to twenty-five per cent, a smaller decrease in strength than was expected. The results of these tests go to show that wherever good material and workmanship are insured a higher load may be applied on masonry of this kind than is usually permitted.

The following is a summary of the conclusions arrived at as a result of these tests:

"Both brick columns and terra cotta block columns gave high strengths in all cases where strong mortar and care in building were used. For central loading the strength of the brick columns ranged from 3,220 to 4,110 pounds per square inch, and the strength of the terra cotta block columns from 2,700 to 3,790 pounds per square inch, the columns having the highest resistance not failing at the full capacity of the machine. The effect of the strength of the mortar is apparent in the carrying capacity developed in the columns; lower loads were found in columns built with one fifth Portland cement mortar than in those with one third Portland cement mortar, still lower loads in those with one third natural cement mortar, and still lower loads in those having one half lime mortar. The effect of the quality of the brick is shown in the columns made with inferior brick, which carried only thirty-one per cent as much as columns built with the better grade of brick.

In the case of the terra cotta columns, the blocks which were culled out as somewhat inferior gave a column strength perhaps thirty per cent less than the columns built with superior blocks. The effect of the attempt to represent hurried or careless workmanship in two brick columns and in three terra cotta block columns was a loss in strength of about fifteen per cent and twenty-five per cent, respectively.

"The ratio of the strength of the columns to the compressive strength of the individual brick and block is of interest. In the well built brick columns loaded centrally, the ratio of strength of column to compressive strength of individual brick ranged from 0.31 to 0.37, and in the underburned clay brick column the ratio was 0.27. In the terra cotta block columns with central loading the ratio of strength of column to that of individual block was 0.74 for the incompleted test and 0.83, 0.85, and 0 89 for the others.

If, as seems to be the case, the strength of the brick or block to resist cross-breaking is an element in determining the strength of the built-up column, a deeper or thicker brick would give higher column strength. It is possible that this partially accounts for the fact that the ratio is found to be higher for terra cotta block columns than for brick columns. The tests suggest that the ability of individual pieces to resist transverse strength is an important element in the strength of the completed column. This suggestion may have an important bearing on the advantageous size of the component blocks which may be used in a compression piece where high strength is desired.

"The strength of the column is greater than the strength of the mortar cubes in both brick and terra cotta block columns, excepting only the soft brick columns which had brick of low compressive strength. It is evident that the strength of individual brick or blocks and the strength of the mortar both enter into the resistance of the column. The relative effect of the two depends upon the character of the material. It is evident, however, that the better the individual piece the more important it is to have a mortar of high resisting strength.

"The results obtained in applying the load eccentrically were found to agree very well with those obtained from ordinary analysis. When the amount of eccentricity in the application of the load is known or may be estimated closely, the ability of the column to resist this action may be calculated quite closely. It is apparent from the results that the calculated resisting stress in the column on the side of maximum compression is higher than that which causes failure in centrally loaded columns. The higher stress developed with eccentric loading is probably due to the influence of the restraint of the less stressed interior portion. The tests made by applying and releasing a single load a number of times gave failures at loads below those which produced failure in similar columns at a single application of the load. The phenomenon is common in materials of the nature of brick and terra cotta.

"It is apparent that the quality of workmanship in laying up such columns has an important bearing upon the resisting strength. The work of building columns, however, is not difficult and requires only ordinary care. Full joints and an even bearing are important, and the ordinary workman ought to be able to construct columns of high strength. In the tests made on columns intended to represent poor or careless workmanship, the decrease in strength was not as much as anticipated. However, it must be understood that careful and trustworthy work is essential and that a few poor joints will materially reduce the strength of the structure. Wherever good material and good workmanship are insured the strength of masonry of this kind may be utilized with advantage."

Copies of the report may be obtained gratis upon application to the director, Engineering Experiment Station, Urbana, Illinois.

The Housing Problem—III.

BY GEORGE B. FORD.

WE HAVE considered the important features which make for healthier living conditions, and they may be summarized as follows:

The most healthful conditions are obtained when the blocks of tenements are only two rooms deep, divided into blocks of units, between which are open stairs. These blocks will run north and south, or nearly so, and will be separated by narrow streets. If such conditions are not obtainable, then the requisites are as follows:

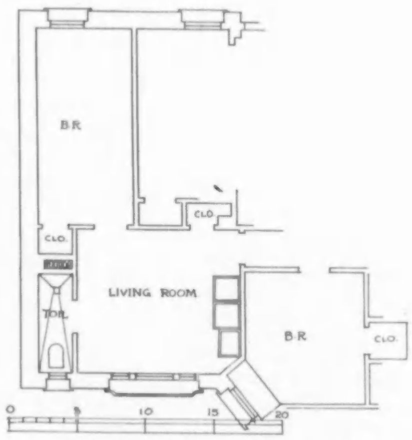
Interior enclosed courts must not be tolerated. Yards and open courts must be sufficiently wide to admit light and sunlight on the shortest day of the year to the ground floor windows. Such courts should open south, or within forty-five degrees of south.

Tenements should not be over five stories in height.

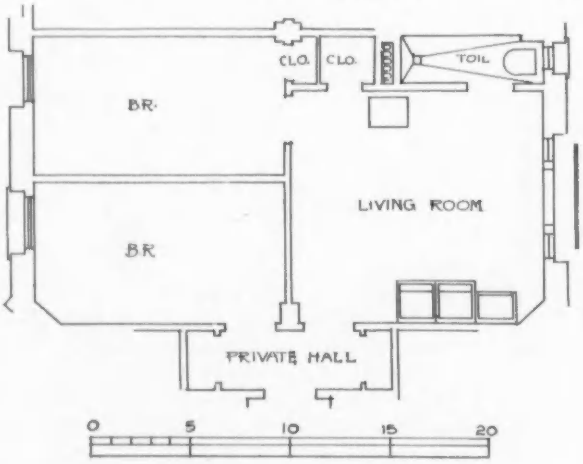
As to the interior, the air should circulate through the apartments, from front to back, through all the rooms, including the toilets. Circulation of air is necessary in winter as well as in summer, the heat coils being so arranged as to permit of the warm air being always fresh. Dampness should be avoided by attention to the construction of the exterior walls.

Good surroundings, clean, well arranged living quarters must raise the standard of living of tenants, and not only that, but they will effect the whole neighborhood.

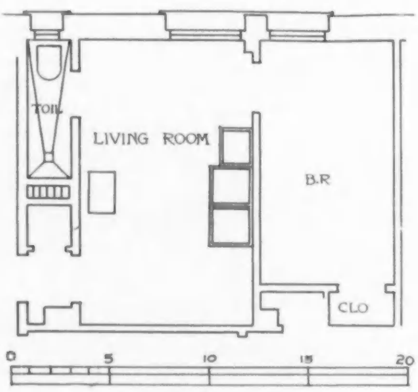
FOUR ROOM SUITE.



ANOTHER THREE ROOM SUITE.



THREE ROOM SUITE.
Large window in living room; private vestibule.



TWO ROOM SUITE.
Shower bath and water closet.

PHIPPS HOUSES NO. 1, NEW YORK.
Grosvenor Atterbury, Architect.

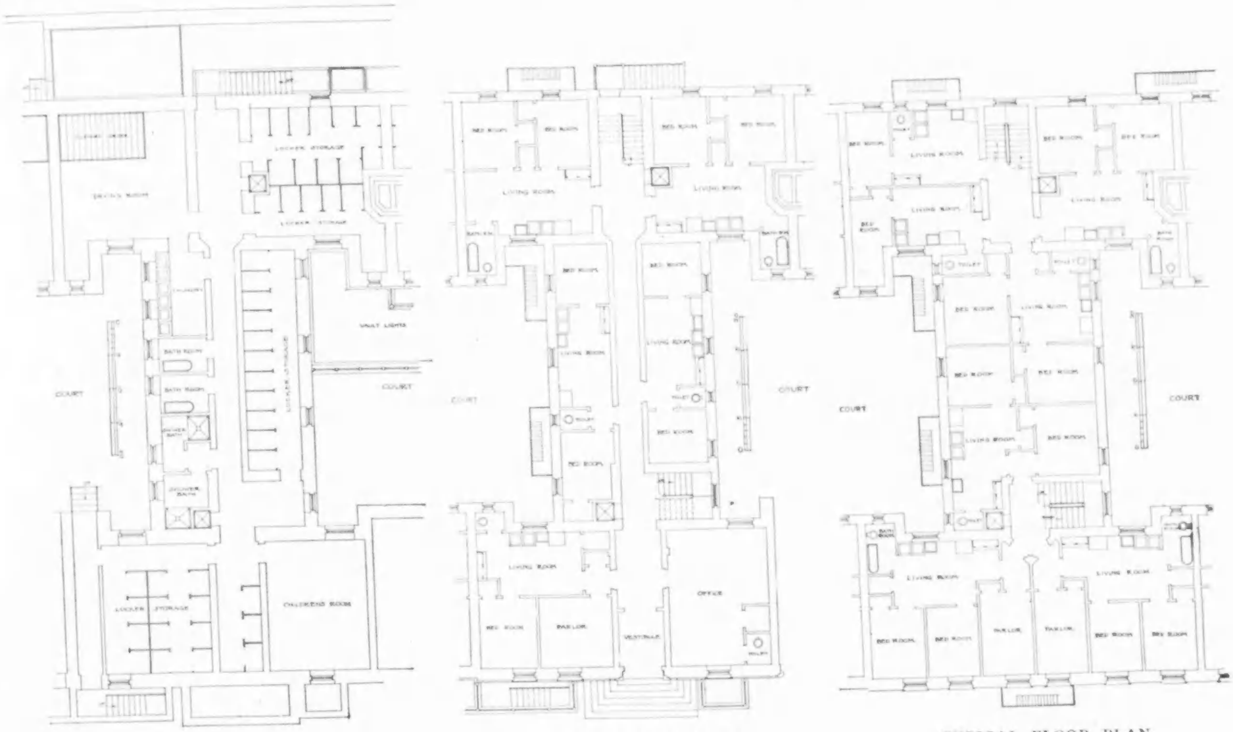
As an example, witness the vastly improved condition of the neighborhood of the Phipps houses on East Thirty-first street in New York. Here within a little over a year after the buildings were open for occupancy, the neighbors have one and all improved the appearance of their houses. Environment may be bettered as follows:

By giving more privacy; by making housekeeping and the care of children easier; by bettering the conditions under which home work may be carried on; by bettering sleeping conditions; by giving better opportunity for recreation and play, and by making the surroundings in every way more cheerful.

Let us take up each of these subjects in turn.

PRIVACY. — The important things which interfere with privacy from without are noise, sights, and smells. The continual din and racket of the streets, of the passing teams, of the hawkers, the elevated, street cars, children playing in the streets; of the piano across the court, and people carousing late at night, and all the thousand and one noises in the air shaft or the interior court; these are nerve racking at best. Again the sordidness and dirtiness of the streets, walls, stairs, and corridors, the refuse and garbage lying in heaps; these cannot but have a detrimental effect on the tenants. And again, the intolerable odors of the streets with the clouds of dust flying all day long, uncollected heaps of garbage, the courts

with their accumulated stench of years; these cannot add to the comfort of those who are condemned to live in such places. All this may be avoided in new districts by scientific town planning along the lines which we described in the second chapter. Streets, bordered with trees and grass plots, houses two rooms deep, long open yards between the rears of the houses (these yards to be planted tion are essential. For bathing of children a small, separate bath in the kitchen is desirable. Such has been used to good advantage in the Rothschilds tenements in Paris, designed by Monsieur Rey. For sleeping, a good circulation of air is necessary. For exercise and play some means must be devised to keep the children off of the street. This is possible either on roof gardens espec-



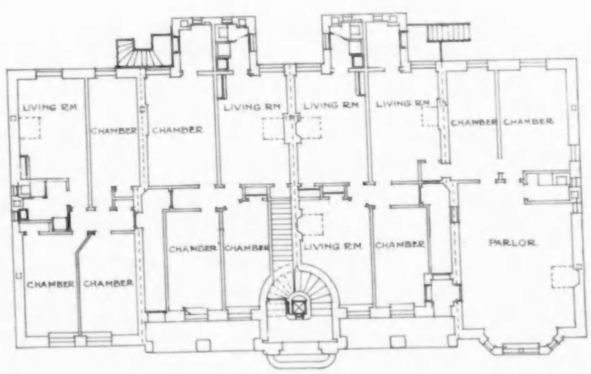
BASEMENT PLAN. GROUND FLOOR PLAN. TYPICAL FLOOR PLAN.

PHIPPS HOUSES NO. 2, FOR COLORED PEOPLE, WEST 63D STREET, NEW YORK.
Whitfield & King, Architects.

and used as playgrounds and small parks); add to this open courts and open stairs and scrupulous cleanliness on the part of the landlords and very few of the evils mentioned would be possible.

Inside the apartment it is essential to secure privacy, especially for the women, to allow them a chance to receive visitors without having to do so in the same room with the rest of the family or without passing through rooms occupied by the others. There should be privacy in the location of the bath room so that it can be entered without passing through any of the living or sleeping rooms. These points can almost always be arranged by a little ingenuity in planning.

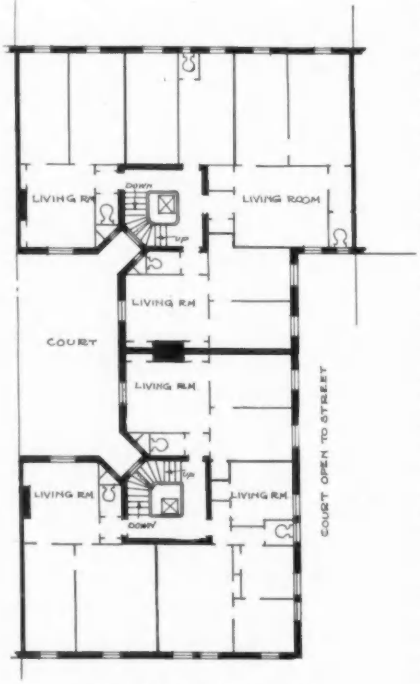
Care of Children.— For the health and care of babies, clean surroundings, plenty of warmth, plenty of sunlight, and good ventilaially arranged for the purpose as in the Phipps houses No. 1 in New York, or in a large, planted interior court as in the A. T. White tenements in Brooklyn, some of the Boston co-operative houses in Boston, or as in many of the most recent German tenements. For play in rainy weather it is possible to reserve a large, open space in the basement of the tenements, such space to be made as bright and well ventilated as possible. In all three cases the maximum of sunlight is desirable. For schooling, a kindergarten in the building is most desirable, as has been proved in the Phipps houses No. 1 and in many of the German tenements. To allow children to go up and down stairs easily a lower hand rail at a convenient height for them should be provided, and further the treads of stairs should be bowed so as to allow a



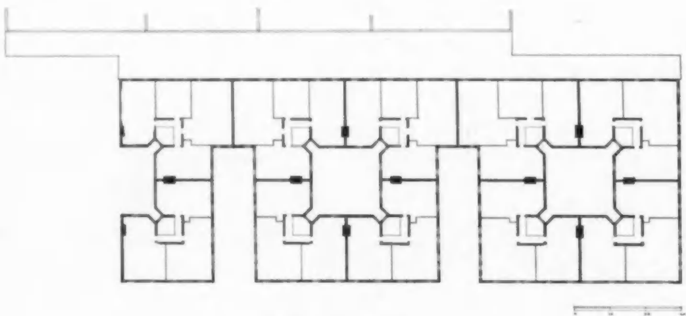
A. T. WHITE TENEMENTS, BROOKLYN.
The pioneer model tenements of America; open stairs; all rooms face open air.

narrower tread next to the rail. This again has been arranged successfully in the Rothschilds tenements in Paris.

Housekeeping.— It is a question whether the kitchen should be in the living room or whether there should be a small kitchen entirely apart from the living room. The cooking, dish-washing, laundering, etc., has to be done where the children may be readily watched at the same time. The best arrangement for securing this end would seem to be a kitchenette leading off of the living room, such to open into the latter throughout its whole length by folding doors. This has worked to good advantage in certain of the better modern light-housekeeping apartments but it has not yet been tried in tenements. For cooking, a gas stove has proved preferable in New York model tenements. It does away with all the space required for coal and ashes with all their attendant dirt. It keeps the whole apartment in much better condition and in general is much easier to handle. It further allows the rooms to be much cooler in summer. It saves, too, considerable space in flues. For the washing of dishes a white enameled iron sink is desirable. The small galvanized iron sinks put in the majority of tenements in New York are anything but convenient or hygienic or conducive to cleanliness. Washing and ironing must be done in the apartment, because the mother can not absent herself from her children. There should be two tubs in the kitchenette. These tubs should be of white enameled earthenware like those placed in many of the recent tenements in New York. They should be adjacent to and just beyond the sink for the convenience of using the space on their covers in dish-washing. For drying the clothes, steam driers may be provided in the basement. The majority of housewives prefer, however, to dry their clothes in the open air. It is not desirable to leave the drying clothes on open lines on the roof, because of the dust and smoke and because of the danger of such clothes being stolen. In certain recent tenements in France and Germany, an open air drying-space has been provided on the roof, such being under cover and divided into locker compartments with lattice partitions, with louvres and dust screens about the exterior. They have worked well and have not proved costly. For cleanliness in sweeping and dusting it is desirable that all corners should be rounded, those of the walls and ceilings as well as those of the floor; that all trim and doors and windows should be as simple in their moldings as possible. The floors are preferably of hardwood, also the trim. In many foreign tenements dust chutes have been provided, leading from the kitchen or back hallway to a large receptacle or incinerator in the basement. There should be an incinerator anyway in the basement in any large group of houses, to take care of the garbage. For convenience in table setting there should be a glass-doored cupboard in the same room as the dining table. This cupboard should be as convenient as possible to the sink. For chamber work, to permit of watching children while it is being done, there should be an open view across to the living room; further the chambers should be convenient to the toilet. Closets should have rounded corners and should be open on two opposite sides if possible with louvres to permit of ventilation of the clothes hanging within. For the care of food there should be a larder open to the outer air, either under the window sill of the kitchen or on a specially constructed interior shaft, constantly provided with purified fresh air. This latter device is successfully provided for in the Rothschilds tenements.



PLAN OF TYPICAL UNIT.



BLOCK PLAN.

MODEL TENEMENTS FOR THE CITY AND SUBURBAN HOMES COMPANY, NEW YORK.

Ernest Flagg, Architect.

These are a few of the features which conduce to the ease and comfort of housekeeping. In practice they will readily suggest others. They embody little extra expense, but will make a very material difference in the pleasantness of family life.

Home Work.—Many tenement dwellers must work at home on clothes, dresses, flower-making, etc. The mothers must earn something. They cannot be separated from their children. To make such home work as agreeable as possible, good sanitary conditions, good ventilation, good light, large living room, convenient to the place where cooking is going on, good light at night, with gas fixtures in the center of the room; all these features are essential.

Sleeping Arrangements.— For healthfulness and comfort in sleeping a means for adequate ventilation must be provided. The windows should extend from the floor to the ceiling, with a means of opening them at top and bottom. If possible there should be sunlight in the

room during the day. The walls should be painted, corners rounded, and everything should be done which would make the room more sanitary. The room should be large enough to provide as an absolute minimum four hundred cubic feet of air space to each individual sleeping therein. The sleeping rooms should be near the toilet.

In order to keep the younger members of the family at home evenings, it is advantageous to have there features which will attract them. In certain recent German and French tenements in a park-like yard behind the houses, there have been provided cafés, restaurants, club rooms, billiard rooms, libraries, and in the open air, seats, fountains, a place for a band to play, a place for small entertainments to be given, and about it all a charming landscape setting. This, for a comparatively small cost, has added immensely to the attractiveness of the houses.

TYPICAL FLOOR PLAN, MODEL TENEMENTS FOR CITY AND SUBURBAN HOMES COMPANY, EAST 68TH AND 69TH STREETS, NEW YORK.
Seven suites and 21 rooms; lot 50′ 0″ by 100′ 0″.
Ernest Flagg, Architect.

Further, the city parks and squares and playgrounds should all be as accessible as possible. People must have a place for relaxation after the day's work. If they cannot have it at home, they will go elsewhere to find it. Hence the desirability from the family standpoint, of making the home surroundings attractive.

Cheerfulness is the one thing which the majority of city tenements lack. They are in most cases unutterably dingy and gloomy. This is bound to have a material effect on the physical and moral nature of the tenement dwellers. How can it be avoided?

Openness. — There should be no interior courts. Exterior courts to be as wide as possible. Windows should be large and airy, opening on to balconies as in certain recent French and German tenements. The rooms should not be too long in proportion to their width. Rows of houses two rooms deep on the north and south plan, above described, will give a maximum openness.

Color. — The colors both of the exterior and the interior of the tenement should be light and warm in tone. Dinginess should be avoided in every possible way. The people themselves demand light colors in their rooms. Abroad, it is the custom to repaint the plaster of the exterior walls every year or so, varying the color from year to year and from house to house. This gives a great deal of variety and charm to the street.

PLAN OF TYPICAL UPPER FLOOR OF C. F. BISHOP TENEMENTS, HESTER STREET, NEW YORK.
Ernest Flagg, Architect.

Architectural Lines. — The barrack type of tenement so common in America and formerly in Germany, and the institutional type of tenement should be avoided. The sky line should be broken and the street line should not be continuous for more than one hundred feet without a break. Attention to this feature means little additional cost but means a great deal in the possible charm of the tenement.

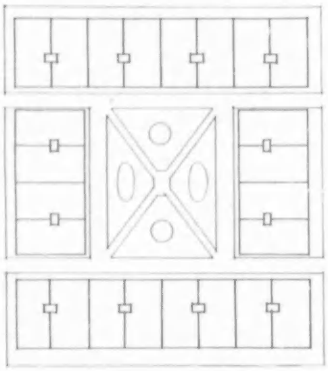
Natural Surroundings. — Growing things, especially trees, are purifiers of the atmosphere. They add immensely to the pleasantness of surroundings. Their cost is the minimum. In every way possible, use should be made of trees, shrubs, lawns, flowers, vines, window boxes, plants, anything which will bring nature into the decorative scheme of the dwellings.

Orientation. — Each room should be considered in itself as to what is its most desirable exposure. Practically none of the rooms should face north exclusively. Sunlight is essential for cheerfulness. This avoidance of a northern exposure may be obtained by the north and south plan which we have already described.

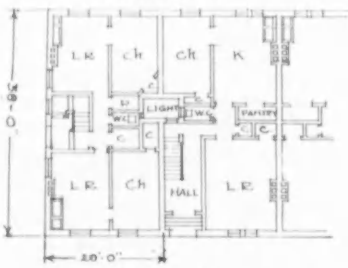
In case this street plan is impossible, all courts should be made to open out and as nearly south as possible, thereby bringing sunlight into the maximum number of rooms.

These features will add greatly to the general happiness and well-being of the tenant, and like the matters previously described, will make a happy family life much more possible.

The conditions and arrangements which make for ideal tenements from the standpoint of comfort and the bettering of family life are similar to those which seem to work the best from the standpoint of safety and health. This shows the necessity of scientific city planning, how, if we are going to give the working people those living conditions which are their right, we must lay out a comprehensive plan for the whole future of the tenement districts. This has not yet been done in America. The agitation for it is strong, and within a compara-



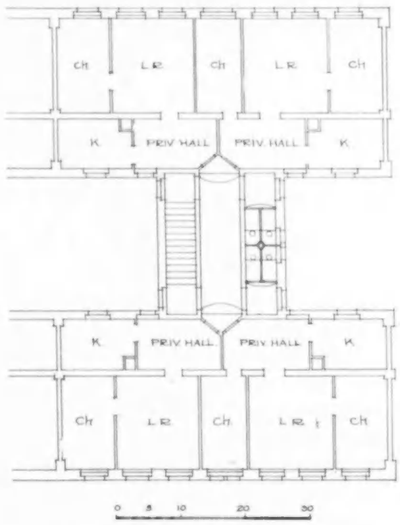
BLOCK PLAN.



TYPICAL FLOOR OF UNITS.

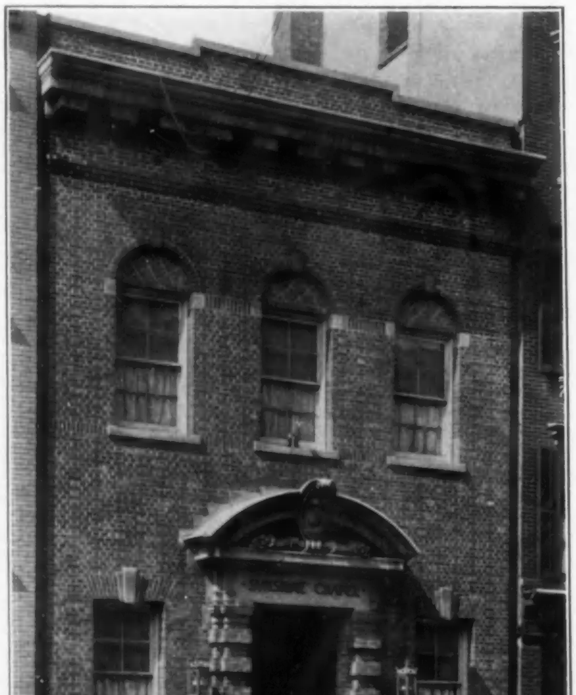
HOUSES OF THE BOSTON COOPERATIVE BUILDING COMPANY, HARRISON AVENUE, BOSTON.

tively short time there is going to be a demand for such comprehensive city plans. For such we must be prepared with a reasonable and adequate solution. I believe that with certain modifications depending on the peculiarities of each individual problem, the typical north and south plan as worked out by Monsieur Rey, of Paris, will solve this problem. I believe that it will make homes out of what have previously been mere shelters from the elements. It will attract rather than repel the working members of the families. The fathers, sons, and daughters who have been away during the day will feel more inclined to stay at home evenings. Family life will be happier and more genuine. It will breed better citizens, it will make more efficient workers, and men better suited to deal with the problems of government and of life. It will create not Beings, but Men.



BLOCK BUILDING OF THE COOPERATIVE BUILDING ASSOCIATION OF DRESDEN, GERMANY.

All living and sleeping rooms are on the outside. Large windows are a feature.



CELLAR PLAN · FIRST FLOOR PLAN · SECOND FLOOR PLAN

BUILDING FOR THE SUNSHINE MISSION,

550 WEST 40TH STREET,

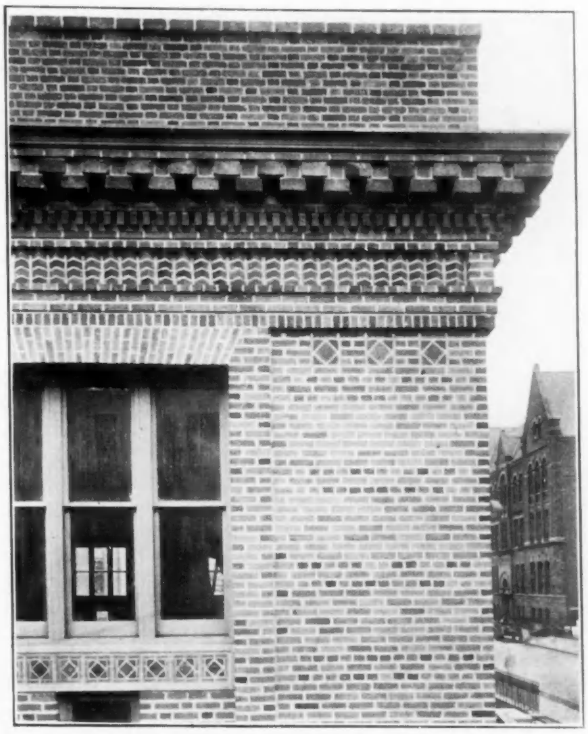
NEW YORK.

Werner & Windolph, Architects.

Editorial Comment and Miscellany.

IN THIS issue we begin the publication of a series of articles, treating of warming and ventilating, prepared by Mr. D. D. Kimball, a member of the American Society of Heating and Ventilating Engineers, and of the Richard D. Kimball Company, Consulting Engineers of New York and Boston.

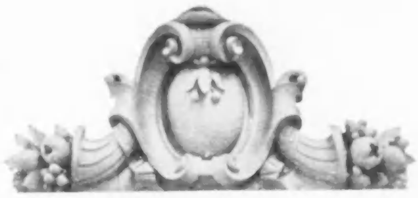
While written with special reference to the needs of hospital buildings, these articles cover briefly the history and literature of ventilating work, the difficulties and forces involved in this field of engineering, and, particularly, the value and importance of ventilation, especially in hospital buildings.



DETAIL OF CARNEGIE LIBRARY, BROWNSVILLE BRANCH, BROOKLYN.
The bricks range in shade from soft gray through several shades of yellow to a real brown. The joints are three-quarter inch, tooled smooth. Special size brick used in cornice and coping. Blue and green tiles are used for decoration. Brick furnished by Fiske & Co., Inc.
Lord & Hewlitt, Architects.

Warming and ventilating are differentiated, and their close association is explained; the composition of the air and its part in ventilating work is made plain; and the volume of air required to maintain definite standards of ventilation is given; proper standards of warming and ventilation are set forth, and the various systems commonly used are described, the fitness of each for different classes of buildings being discussed. A series of formulas is given covering that part of the work by means of which the size of radiators, boilers, chimneys, pipes, flues, ducts, and other details may be determined.

In a series of articles of this nature, it is not possible to cover the entire field of ventilating engineering, or to discuss the theory of the work, but sufficient details are given to enable one generally familiar with the practices of the trade, to design an ordinary system, or, what is quite as important, to correctly check or judge of any plans for warming and ventilating work that may be presented to the architect. In presenting this series of articles, we recognize the fact that the architect is the professional adviser of his client, and as such should be able to convince the client of the value of ventilation, and give substantial proof therefor, as well as to be able to decide on the best system to be used for the work in hand.



DETAIL BY NEW YORK ARCHITECTURAL TERRA COTTA COMPANY.

But relatively few architects appreciate the fact that thorough ventilation will increase the capacity of a hospital building from twenty-five per cent to forty per cent, by reducing to that extent the average number of days required for a cure. It is hoped that this and similar statements made and proved in these papers will lead the architect to insist that this vital feature of a building shall be considered by his clients quite as important as the building's arrangement or its ornamentation.

The architect's position as professional adviser to his client assumes a certain familiarity with anything which so vitally affects the success of the enterprise, and if these articles assist him in this important matter, their purpose will have been achieved.

DETAILS FOR SCHOOLHOUSE, PHILADELPHIA.
Conkling-Armstrong Terra Cotta Company, Makers.
J. Horace Cook, Architect.

POWER TO LIMIT BUILDINGS.

THE decision of the United States Supreme Court in the case of Francis C. Welch, trustee, against the building commissioner of Boston, has an application to every city in the country where skyscrapers are erected or contemplated. In supporting the commissioners in their refusal to grant a permit to Mr. Welch to erect a building 124 feet high, it upholds absolutely the right of a state, under its police powers, to limit the height of buildings in an arbitrarily determined section

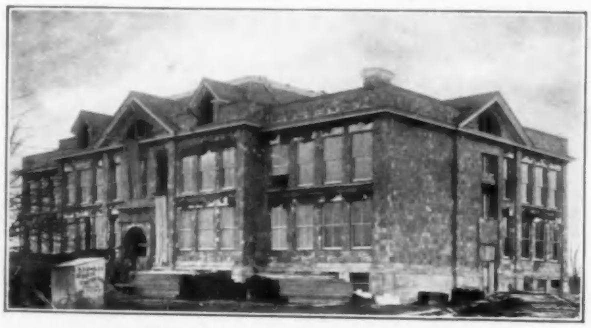
of a city without offering compensation to property owners.

An act of the Massachusetts legislature, passed in 1904, divided the city of Boston into two sections, business and residential, and limited the height of buildings in the former to 125 feet and in the latter to 80 feet. The land on which Mr. Welch desired to erect his building was in the residential section, and the application was refused by the building commissioner. Appeal was then made from the commissioner to the Board of Appeal on the ground that the acts of the former were unconstitutional. The board supported the commissioner, and the case was taken to the courts. The decision supports that of all the previous tribunals.

SMALL STORE BUILDING, CHICAGO.
Front of terra cotta made by Northwestern Terra Cotta Company.
Marshall & Fox, Architects.

The case was the first that has come before the Supreme Court on the question of building restriction, and its decision is of wide import.

The contention of Welch was that the law was unconstitutional, being unelastic, and hence unreasonable and not a proper exercise of the state police power. The Supreme Court, however, held that the law was reasonable and properly in the interest of the public health and safety.



SCHOOLHOUSE, ROSELLE PARK, N. J.
Walls of terra cotta hollow tiles made by National Fire-Proofing Company. Cost of building complete, $65,000. Fire-proof throughout except roof timbers.
Pierce & Bickford, Architects.

DAMAGES were awarded a tenant for the loss of vault privileges under the pavement by the United States Circuit Court in New York a few weeks ago, but the case is to be taken to the United States Court of Appeals. The Pabst Brewing Company, having leased from Charles Thorley a building that stood at the southerly end of the triangle now occupied by the Times Building, made a considerable outlay in fitting up the sub-surface space as a rathskeller. In 1904 the city revoked the vault privilege as the space was needed for the subway.

The Pabst Company vacated the property and brought suit. The judgment just awarded amounted to $88,830 and was based on $45,000 for the value of the lease in 1902, $18,000 for the loss of decorations and other improvements unfit for use elsewhere, and the balance for interest losses. If the judgment holds, there will no doubt be a change in the wording of future leases in New York, for the covenant has customarily been to permit the tenant "to peacefully and quietly enjoy the property," etc.

The decision also affects innumerable other properties, the improvement of which includes vault accommodation obtained by the payment of a small fee. If the privilege is revokable, there must henceforth be economy in subterranean equipment and furnishing.

WITH considerable spirit Baltimore rejects the proposal of the Pennsylvania Railroad to build a new station in the city which will cost only half a million. Pointing to Washington's magnificent new structure, it demands a grand union station commensurate with the importance of Baltimore and its future needs. Until this be assured there is talk of withholding concessions descried by the railroads. The art commission, whose opinion of the plans will have influence, includes among prominent citizens, architects Douglas H. Thomas, Jr., Josias Pennington, and Joseph Evans Sperry.

THE Twelfth Competition of the John Stewardson Memorial Scholarship in Architecture has been awarded by the managing committee to Grant Miles Simon, an undergraduate of the school of architecture at the University of Pennsylvania. Five mentions were awarded, all to members of the University school of architecture or its atelier, as follows: First, Lucius Read White; second, Roy Childs Jones; third, Charles L. Bolton; fourth, George S. Koyl; fifth, Earl F. Bankes. The jury consisted of Messrs. Edward L. Tilton, Robert D. Kohn, John Mead Howells, and John V. Van Pelt, all of

DETAIL BY EAMES & YOUNG, ARCHITECTS.
Winkle Terra Cotta Company, Makers.

New York. The Stewardson Scholarship grants $1,000 for a year's travel and study in Europe. It is open for competition to any person under thirty years of age who has studied or practised architecture in the state of Pennsylvania for at least one year preceding the date of the final examination. In this year's competition thirty-one (31) designs were entered from four ateliers (Pittsburg, Wilkes-Barre, T Square Club, and the University Atelier in Philadelphia) and from the school of architecture, University of Pennsylvania.

OLIVER BUILDING, PITTSBURG, PA.
Exterior of dull cream enameled terra cotta, made by Atlanta Terra Cotta Company.
MacClure & Spahr, Architects.

ON APRIL 28th unusual honors were paid to the memory of Major Pierre Charles L'Enfant, the French engineer who, under the authority of George Washington, laid out the city of Washington. Having been disinterred from its resting-place on Digges Farm, in Maryland, the body was taken to the Capitol at Washington under military escort, and there, in the rotunda which forms the center of his plan for the city, it lay in state while Vice-president Sherman and Ambassador Jusserand paid tribute to his memory. In the afternoon the body was taken under military escort to the Arlington National Cemetery, where religious services accompanied its interment.

HOUSE AT INGRAM, PA.
Built of "Bradford Red" Brick, made by Bradford Pressed Brick Company, Bradford, Pa.
F. J. Osterling, Architect.

THE first annual exhibition of the Minneapolis Architectural Club was held in the galleries of the Builders' Exchange, April 17th to May 3d. The club catalogue was made unusually interesting by a number of colored prints.

HOTEL SECOR—TOLEDO.

GEORGE S. MILLS, ARCHITECT.

(See illustrations in plate forms.)

THE building is 120 feet by 169 feet, ten stories and basement. The cost was 24½ cents per cubic foot, measured from average footing level to highest part of roof, leaving out court. The building is equipped with three 250 horse power water-tube boilers; three generators; ice making and refrigeration plant; four plunger elevators; complete ventilating plant; artesian well; pumping plant, etc.

There is a ball room and convention hall on the ninth floor, and servant's quarters and laundry on the tenth floor.

Every room has in connection either a complete bath room or toilet room with lavatory and water-closet.

IN GENERAL.

John Scott & Co., architects, announce the removal of their offices from the Moffat Building to the Ford Building, Detroit.

Arthur S. Meloy, formerly of Meloy & Beckwith, architects, Bridgeport, Conn., has opened an office in the Post Office Arcade of that city. Manufacturers' catalogues desired.

HOUSE AT ST. PAUL, MINN.
Built of "Autumn Leaf" brick, made by Twin City Brick Company.
Clarence H. Johnston, Architect.

The partnership of Mills & Pruitt, architects, Columbus, Ohio, has been dissolved. Wilbur T. Mills will continue at the present address, 49 North High street, while Edwin E. Pruitt has opened offices in the Young Men's Christian Association Building.

Arthur Dillon, Hugh McLellan, and Henry L. Beadel have associated under the firm name of Dillon, McLellan & Beadel, for the practice of architecture. Offices 1123 Broadway, New York.

McLaughlin & Siebert, architects, have opened an office in the Wright Building, Pittsfield, Mass. Manufacturers' catalogues and samples desired.

At the annual meeting of the Detroit Architectural Club, held April 5th, the following officers were elected for the ensuing year: Dalton R. Wells, president; Oscar Gottesleben, vice-president; D. J. V. Snyder, secretary; J. H. Gustav Steffens, treasurer.

DETAIL BY LONG, LAMOREAUX & LONG, ARCHITECTS.
American Terra Cotta & Ceramic Company, Makers.

The annual exhibition of the Washington Architectural Club was held in the Corcoran Gallery of Art from May 4th to 11th. Combined with this exhibition was another of etchings and colored woodblock prints by Baroness Hedwig Lekow.

The Bellevue-Stratford Hotel in Philadelphia is to be enlarged by the erection of a sixteen-story addition containing three hundred and sixty bedrooms.

At the first annual meeting of the Seattle Architectural Club the following officers were elected for the ensuing year: D. J. Myers, president; J. C. Stanley, vice-president; H. O. Mouldenhour, secretary; E. E. Ziegler, treasurer.

McGREGOR MEMORIAL HOME, CLEVELAND, OHIO.
Roofed with Imperial Spanish Tile, made by Ludowici-Celadon Company.
Badgley & Nicklas, Architects.

The old Hotel Metropole in New York, owned by the Coe estate, is to be torn down and a six-story fireproof business building erected on the site. The foundation walls of the new structure are to be made strong enough to support the weight of twenty-four additional stories if later needed. Henry Ives Cobb is the architect.

The New York Produce Exchange is considering selling its property, which contains about 70,800 square feet and is valued at $6,000,000. Only a small proportion of this area is needed by the Exchange for its own use; and with the money received from a sale, therefore, it is proposed to build, for about $1,000,000, a new exchange building fronting Broad street. The remaining $5,000,000 will be held or disbursed among the members.

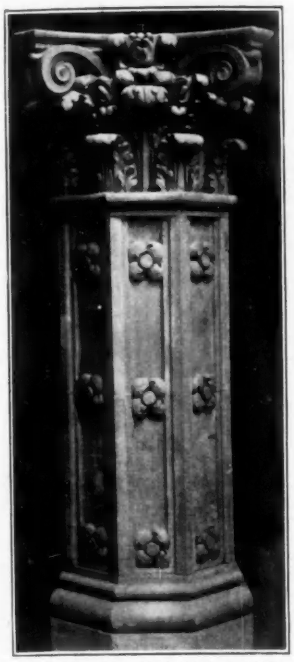
Another well-known hotel in New York that is to give way to the march of improvements is the Belvedere, a German hostelry on Fourth avenue. A sky-scraper is to take its place, as was the case with its neighbor, the Florence House, on the opposite side of Fourth avenue.

The New York State Commission in Lunacy and the Board of Managers of the Long Island State Hospital have bought 548 acres of ground at Greenvale, Long Island for $412,000. This property will be used for the establishment of the newly planned Long Island State Hospital and is intended for patients committed from Brooklyn.

M. J. G. Crosset Montagne, a well-to-do French architect, was the passenger in the automobile taxicab which was run down by James Hazen Hyde's automobile at the intersection of the rue Rocher and the rue Vienne in Paris, on October 29th, and as a result of which Mr. Hyde has just been sentenced to prison for one month.

The Shuberts are to build new theaters in Minneapolis and St. Paul.

Tracy, Swartwout & Litchfield, of New



DETAIL BY HELMLE & HUBERTY, ARCHITECTS.
South Amboy Terra Cotta Company, Makers.

York, won the competition for the new Post Office and Federal Building at Denver. There were sixteen competitors. The official cost of the building is put at $1,500,000.

The architectural terra cotta used in the Hotel Secor, Toledo, George S. Mills, architect, illustrated in the plate forms of this issue, was furnished by the Atlantic Terra Cotta Company. The terra cotta for the church at Chattanooga, McKim, Mead & White, architects, is being furnished by the Atlanta Terra Cotta Company.

S. B. Dobbs, of Philadelphia, will supply the light gray impervious brick which is to be used for the interior of the immense building which is being erected in Philadelphia for the Curtis Publishing Company, Edgar V. Seeler, architect. These bricks will take the place of the usual plastered walls. This is one of the largest contracts ever let for a high grade face brick.

DETAIL BY SCHWARTZ & GROSS, ARCHITECTS.
New Jersey Terra Cotta Company, Makers.

"Ironclay" bricks, made by the Ironclay Brick Company, of Columbus, Ohio, and furnished by O. W. Ketcham, Philadelphia, were used in the Eagles' Building, Camden, N. J., Thomas, Churchman & Molitor, architects, illustrated in the plate forms of this issue.

Hydraulic-press brick—impervious gray—will be used in the new Hermitage Hotel, Chattanooga, Tenn. Carpenter, Blair & Gould, of New York, architects.

Dark red wire-cut bricks, made by the Western Brick Company, of Danville, Ill., were used in the house at Milwaukee, Kirchhoff & Rose, architects, illustrated in the plate forms of this issue.

COMPETITION FOR A BRICK HOUSE.

Cost not to Exceed $10,000.

FIRST PRIZE, $500. **THIRD PRIZE, $150.**
SECOND PRIZE, $250. **FOURTH PRIZE, $100.**
MENTIONS.

PROGRAM.

THE problem is a house with walls built of brick. Porches, verandas, or piazzas may be in part or wholly of brick or wood.

The cost of the house (exclusive of the land) including heating — equipment complete; plumbing — including all fixtures; gas piping and electric wiring — with fixtures, is not to exceed $10,000.

Designs which in the opinion of the jury call for a house which would cost more than the amount named to execute will not be considered.

The plan should provide accommodations for a family of five — three adults and two children — and at least one servant. There are no restrictions as to size, shape, or style of house — except the cost — nor the size, shape, or location of lot.

The particular object of this Competition is to obtain designs for a BRICK HOUSE of moderate cost. It is especially desired that the treatment of the exterior shall show the possibilities in obtaining charming but restrained effects by the use of bond and jointing and pattern. The BRICK HOUSE is rich in precedent, and the material, whether considered from the esthetic or the practical standpoint, meets in the fullest measure the demands put upon it. To summarize; — the Competition calls for A CHARMING BRICK HOUSE OF MODERATE COST.

CONSTRUCTION.

The methods usually employed in the construction of brick walls may be followed, except that the walls are to be wholly of brick and of sufficient thickness to safely carry the load. The program does not call for a fireproof house, although that form of construction is not objected to. The choice of brick is left to the designer.

DRAWINGS REQUIRED.

On one sheet a pen and ink perspective, without wash or color, drawn at a scale of four feet to the inch. Also plans of first and second floors at a scale of eight feet to the inch. In connection with the plan of the first floor show as much of the arrangement of the lot in the immediate vicinity of the house as space will permit.

On another sheet, at the top, the front elevation drawn at a scale of eight feet to the inch, — and below the elevation, a sufficient number of details to properly show the brickwork and the special features of the design, — drawn at half inch scale in black ink without wash or color. Sections shown are to be cross-hatched in such manner as to clearly indicate the material, and floor plans are to be blocked in solid.

The size of each sheet is to be exactly 24 inches by 18 inches. Strong border lines are to be drawn on both sheets one inch from edges, giving a space inside the border lines 22 inches by 16 inches. The sheets are not to be mounted.

Each set of drawings is to be signed by a *nom de plume* or device, and accompanying same is to be a sealed envelope with the *nom de plume* on the exterior and containing the true name and address of the contestant.

The drawings are to be delivered flat, or rolled (packaged so as to prevent creasing or crushing), at the office of THE BRICKBUILDER, 85 Water Street, Boston, Mass., on or before Sept. 15, 1909.

Drawings submitted in this Competition are at owner's risk from time they are sent until returned, although reasonable care will be exercised in their handling and keeping.

The designs will be judged by three or five well-known members of the architectural profession.

In making the award the jury will take into account the fitness of the design in an artistic sense to the material employed; the adaptability of the design as shown by details to the practical constructive requirements, and the excellence of the plan.

Drawings which do not meet the requirements of the program will not be considered.

The prize drawings are to become the property of THE BRICKBUILDER, and the right is reserved to publish or exhibit any or all of the others. The full name and address of the architect will be given in connection with each design published. Those who wish their drawings returned, except the prize drawings, may have them by enclosing in the sealed envelopes containing their names ten cents in stamps.

For the design placed first there will be given a prize of $500.
For the design placed second a prize of $250.
For the design placed third a prize of $150.
For the design placed fourth a prize of $100.

This Competition is open to everyone.

The prize and mention drawings will be published in THE BRICKBUILDER.